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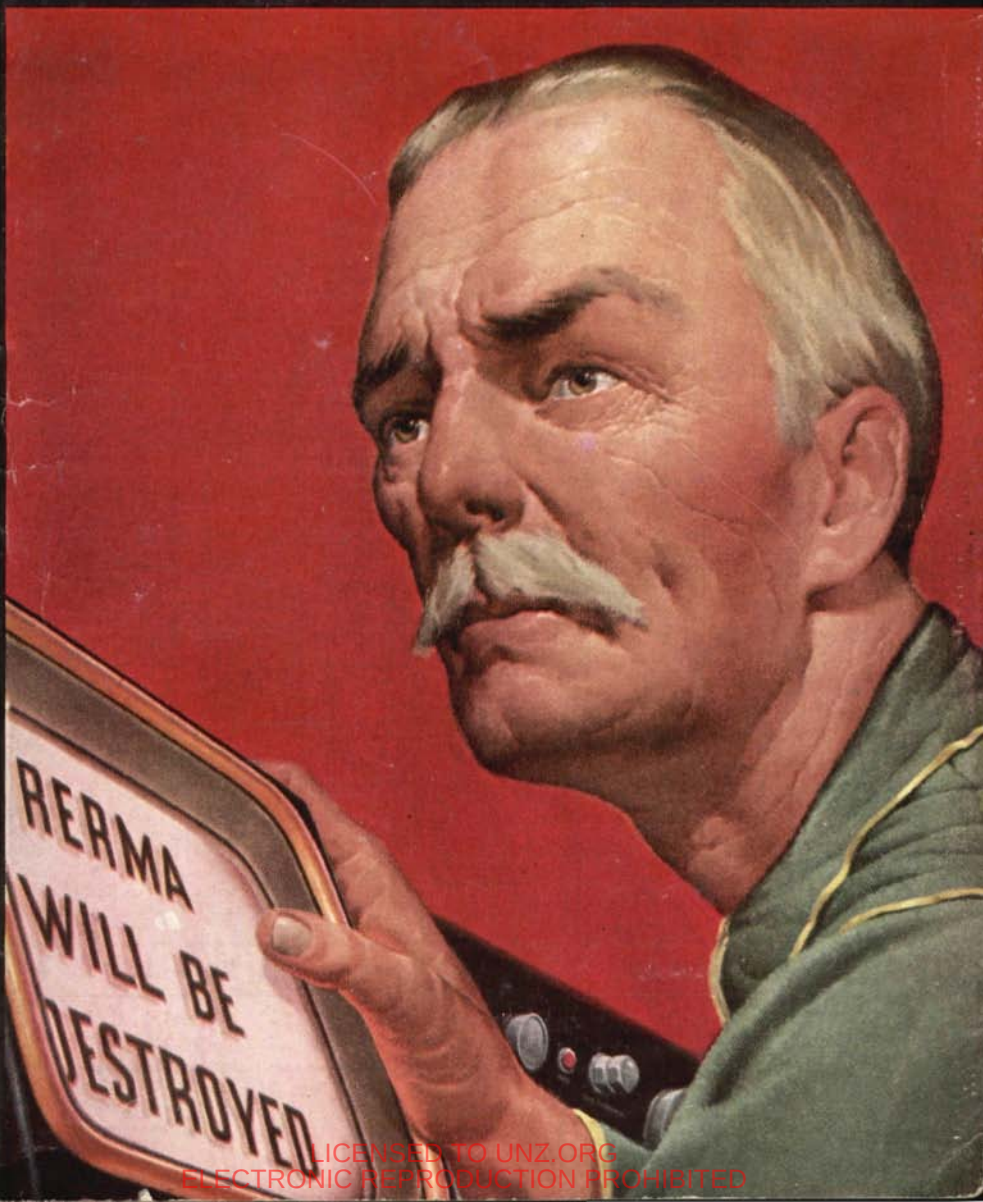

DIUUU S A NUVEL BY CHAD OLIVER

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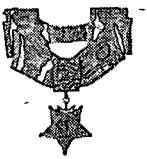

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Astounding
SCIENCE FICTION

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ARISTOTELIAN THINKING

The development of philosophy in recent decades has tended strongly toward the general pattern Korzybski and other semanticists proposed—that Aristotelian thinking, in terms of true-false thinking, is wrong, unacceptable, and leads only to error.

Let's try another hypothesis. It's observable that Aristotelian thinking as it has been used has, in fact, led to aberrated behavior of men, cities and nations. There are at least two possibilities there, however; one, that the Aristotelian yes-no thinking technique is inherently wrong, or, second, that it has been ineptly applied.

The physical sciences have outstripped all other fields of human development; the physical sciences are also the only field of human activity in which the *true essence of Aristotelian thinking is applied*. That basic concept is simply that a concept is true or it is false, and there is no intermediate ground. In physical science, a theory works *every* time, or it is recognized as being false-to-fact.

Let's recognize that the old philosopher's hunt for the definition of "Truth" was misguided; "Truth" doesn't exist any more than "Largeness" or "Tableness" does—"truth" is an adjectival concept purely, and only the *true statement* can exist in fact. There is no such thing as "largeness," though large objects do exist.

Then we can define a "true statement" as one which has a one hundred per cent probability of recurrence. Any action that happens is true; there is a one hundred per cent probability of that action recurring in that form at that point in time. Basically, only the past and the present can be completely true; any prediction of the future is a shade less than true—even the statement that "the sun will rise tomorrow" has a certain probability of non-recurrence. (Some laboratory *might* discover the light-element self-sustaining chain reaction between now and then!)

Physical science has simply operated on the basis of setting up statements that conformed to that definition of "true"; if a physical science theory did not show unbroken, one hundred per cent recurrence, it was immediately classified as "inaccurate, inadequate, wrong in detail, but tempo-

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rarily useful until we get a better statement of the matter." Newton's Law of Gravity disagreed with the position of Mercury in its orbit by about forty seconds of arc per century; Newton's gravitational law was recognized as inadequate.

Physical science makes such statements as "In a period of Time T, one half of any starting quantity, Q, of a radioactive element will have undergone transformation." A proportionality can be true; it is not necessary that a true statement be an absolute.

So physical science *does* operate on Aristotelian thinking—a theory is considered *true* only so long as it works invariably—only so long as it is not-false.

Human beings have kidded themselves for a long time that they did non-Aristotelian thinking, long before the term was invented. As a matter of neurological fact, *the human brain is incapable of anything but Aristotelian thinking*. The mind is a function of a certain physical structure—the brain. But the brain is made up of neurones, and the most careful studies show that neurones are capable of two, and only two reactions—*fire* or *not-fire*. Yes or no. True or False.

You could get into a lot of trouble if you presented a digital computer with a problem set up in a fashion intended for an analogue computer. You could get a human being into a lot of trouble if you insist that he think in terms of A equals B, too—and for purely Aristotelian reasons! How would a neuron-mechanism capable only of yes-or-no, handle a datum presented as "This is yes *and* no," which would require that the neuron both fire and not-fire?

The idea that Aristotelian logic prevents the existence of grays is decidedly inaccurate thinking. In the article section of this magazine there are photographs which are purely Aristotelian in their nature; they contain no grays whatever, since our presses do not use gray ink, and therefore can't produce a gray tone; they contain nothing but black and white. Physiologists long since discovered that a muscle cell is incapable of exerting controlled degrees of action—it, too, works on an all-or-nothing basis. But with several tens of thousands of individual cells, the *effect* of graduated effort is readily obtained.

The danger of attempting non-Aristotelian thinking is quite simple; if you feed a "semi-truth" concept into a computer that is inherently capable only of yes-no response, you will inevitably get a wrong result. The problem can not be resolved on such a basis, and efforts to insist that it must be so resolved lead only to a man who *says* and even *believes* he thinks in terms of semi-truths. But I can't quite see how a yes-no relay mechanism can think in semi-truth terms. The man must actually be operating on yes-no basis, but with the always-dangerous delusion that he is thinking in a manner other than the manner he

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actually thinks.

The way to get right answers from a yes-no computer is to feed in the problem in yes-no terms. If you try to get a printing press to print a photograph that has *not* been broken up into half-tone dots, the result you get is a horrible, blurred distortion.

The Bell Telephone Laboratories developed a technique of transmitting television images on a step-by-step basis. The first setup was to arrange a device that measured the light-intensity reflected from any area of the scene, and determine whether it *was* or *was-not* greater than a certain fixed level. This was sent as a series of yes-no signals, and produced a "one-step" picture. All areas of the picture resulting were either black or white.

The result was a crude, but thoroughly recognizable pattern of black and white.

Next development was to break the "yes" range and the "no" range into two steps each. There were then four levels—A, B, C, and D Level. Still, the message was being sent as a "yes-no" signal—but now the picture was a pretty fair quality reproduction of the original.

At seven steps, the picture was as good as any modern television picture —which is pretty fair, but nowhere near as fine as we ultimately want.

There were "grays" in such a picture—yet the problem of the real world the electronic mechanism faced was being broken down into only seven stages of yes-no decisions. Now, naturally if the seven-step-receiver were fed with the output of the standard television pickup, it would get a horribly confused mess; it is a step-system reproducer, and if someone insisted on feeding it intermediate values, it would be highly unstable.

The interesting thing to consider is that we *do* live in an Aristotelian universe. An electron either is or is-not—there are no semi-electrons. Light comes in quanta. Matter comes in molecular units. The universe *is* made up of yes-no factors. And yes-no factors alone can analyze a yes-no universe.

The only problem is to get the level of resolution down fine enough to make a sound yes-no decision. The inspection department of any manufacturing firm has this problem. Parts may *look* all right, but the problem of yes-no, of pass-reject, must be pushed below the level of appearances to be applicable. So special tools are used to push the level of resolution back further. Go-No-Go gauges for size, or down to X-ray examination—each is an effort to push the level of resolution of the yes-no down fine enough to permit sane decision.

But that doesn't mean the use of non-Aristotelian thinking!

THE EDITOR.

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BLOOD'S A ROVER

BY CHAD OLIVER

It's a very hard thing indeed for a man to define what he means by "good"—and hard, sometimes, to see good in the misery, disorganization and squalor that results.

Illustrated by van Dongen

Clay lies still, but blood's a rover;
Breath's a ware that will not keep.
Up, lad: when the journey's over
There'll be time enough to sleep.
A. E. Housman.

I.

Night sifted through the city like flakes of soft black snow drifting down from the stars. It whispered along the tree-lined canyons between the clean shafts of white buildings and pressed darkly against windows filled with warm light. Conan Lang watched the illumination in his office increase subtly in adjusting to the growing darkness outside and then looked again at the directive he held in his hand.

It still read the same way.

"Another day, another world," he said aloud. And then, paraphrasing: "The worlds are too much with us—"

Conan Lang fired up his pipe and puffed carefully on it to get it going properly. Then he concentrated on blowing neat cloudy smoke rings that wobbled across the room and impaled themselves on the nose of the three-dimensional portrait of the President. It wasn't that he had anything against President Austin, he assured himself. It was simply that Austin represented that nebulous being, Authority, and at the moment it happened that Authority was singularly unwelcome in the office of Conan Lang.

He looked back at the directive. The wording was friendly and informal enough, but the meaning was clear:

Headquarters, Gal. Administration.
Office of Admiral Nelson White,
Commander, Process Planning Division.
15 April, 2701. Confidential.

One Agent Conan Lang
Applied Process Corps
G.A. Department Seven
Conan:

We got another directive from the Buzzard

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yesterday. Seems that the powers that be have decided that a change in Sirius Ten is in order—a shift from Four to Five. You're it. Make a prelim check and report to me at your convenience. Cheer up—maybe you'll get another bag of medals out of it.

Nelson.

Conan Lang left the directive on his desk and got to his feet. He walked over to the window and looked out at the lights sprinkled over the city. There weren't many. Most people were long ago home in the country, sitting around the living room, playing with the kids. He puffed slowly on his pipe.

Another bag of medals. Nelson wasn't kidding anybody—wasn't even trying to, really. He knew how Conan felt because he felt the same way. They all did, sooner or later. It was fascinating at first, even fun, this tampering with the lives of other people. But the novelty wore off in a hurry—shriveled like flesh in acid under a million eyes of hate, a million talks with your soul at three in the morning, a million shattered lives. Sure, it was necessary. You could always tell yourself that; that was the charm, the magic word that was supposed to make everything fine and dandy. Necessary—but for *you*, not for them. Or perhaps for them too, in the long run.

Conan Lang returned to his desk and flipped on the intercom. "I want out," he said. "The Administration Library, Division of Extraterrestrial Anthropology. I'd like to speak to Bailey if he's there."

He had to wait thirty seconds.

"Bailey here," the intercom said.

"This is Lang. What've you got on Sirius Ten?"

"Just like that, huh? Hang on a second."

There was a short silence. Conan Lang smoked his pipe slowly and smiled as he visualized Bailey punching enough buttons to control a space fleet.

"Let's see," Bailey's voice came through the speaker. "We've got a good bit. There's McAllister's 'Kinship Systems of Sirius Ten'; Jenkins' —that's B. J. Jenkins, the one who worked with Holden—'Sirius Ten Social Organization'; Bartheim's 'Economic Life of Sirius Ten'; Robert Patterson's 'Basic Personality Types of the Sirius Group'; 'Preliminary and Supplementary Ethnological Surveys of the Galactic Advance Fleet'—the works."

Conan Lang sighed. "O.K.," he said. "Shoot them out to my place, will you?"

"Check—be there before you are. One thing more, Cone."

"Yes?"

"Been reading a splendid eight-volume historical novel of the Twentieth Century. Hot stuff, I'll tell you. You want me to send it along in case you run out of reading material?"

"Very funny. See you around."

"So long."

Conan Lang switched off the intercom and destroyed the directive. He

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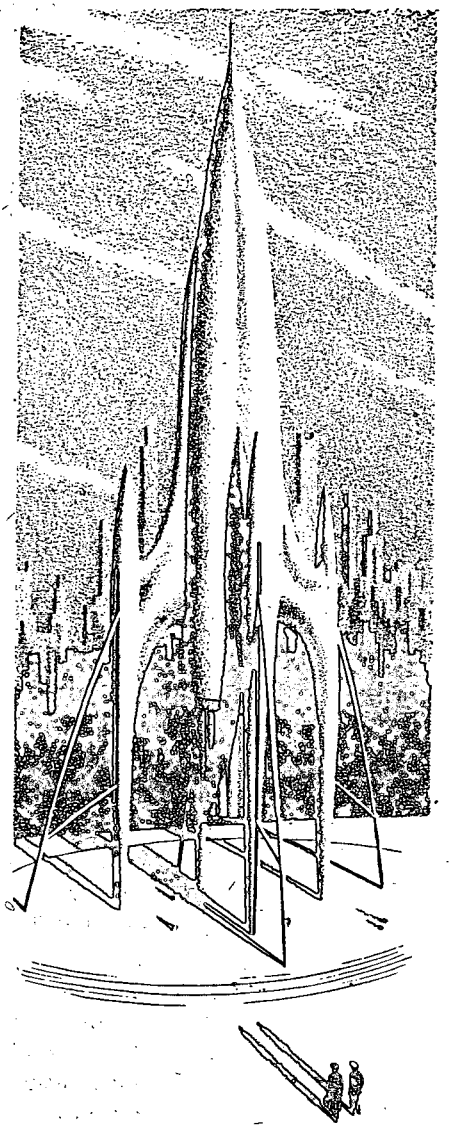
tapped out his pipe in the waster and left the office, locking the door behind him. The empty hallway was sterile and impersonal. It seemed dead at night, somehow, and it was difficult to believe that living, breathing human beings walked through it all day long. It was like a tunnel to nowhere. He had the odd feeling that there was nothing around it at all, just space and less than space—no building, no air, no city. Just a white antiseptic tunnel to nowhere.

He shook off the feeling and caught the lift to the roof. The cool night air was crisp and clean and there was a whisper of a breeze out of the north. A half moon hung in the night, framed by stars. He looked up at it and wondered how Johnny was getting along up there, and whether perhaps Johnny was even then looking down on Earth.

Conan Lang climbed into his bullet and set the controls. The little ship rose vertically on her copter blades for two thousand feet, hovered a moment over the silent city, and then flashed off on her jets into the west.

Conan Lang sat back in his cushioned seat, looking at the stars, trying not to think, letting the ship carry him home.



Conan Lang relaxed in his armchair, his eyes closed, an icy bourbon and soda in his hand. The books he had requested—neat, white, uniform microfilm blowups from the Administration Library—were stacked neatly

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on the floor by his side, waiting. Waiting, he thought, sipping his drink. They were always waiting. No matter how much a man knew, there was always more—waiting.

The room closed in around him. He could feel it—warm, friendly, personal. It was a good room. It was a room filled with life, his life and Kit's. It was almost as if he could see the room better with his eyes closed, for then he saw the past as well as the present. There was the silver and black tapestry on the wall, given to him by old Maharani so long ago, on a world so far away that the very light given off by its sun when he was there had yet to reach the Earth as the twinkle of a star in the night sky. There were his books, there were Kit's paintings. there was the smudge—the current one—on the carpet where Rob had tracked dirt into the house before supper.

He opened his eyes and looked at his wife.

"I must be getting old, Kit," he said. "Right at the moment, it all looks pretty pointless."

Kit raised her eyebrows and said nothing.

"We tear around over the galaxy like a bunch of kids playing Spacemen and Pirates," he said, downing his drink. "Push here, pull there, shove here, reverse there. It's like some kind of half-wit game where one side doesn't even know it's playing, or on which side of the field. Sometimes—"

"Want another drink?" Kit asked softly.

"Yes. Kit—"

"I know," she said, touching his shoulder with her hand. "Go ahead and talk; you'll feel better. We go through this every time there's a new one, remember? I know you don't really mean things the way you say them, and I know why you say them that way anyhow." She kissed him lightly on the forehead and her lips were cool and patient. "I understand."

Conan Lang watched her leave the room with his empty glass. "Yes," he whispered to himself. "Yes, I guess you do."

It *was* necessary, of course. Terribly, urgently necessary. But it got to you sometimes. All those people out there, living their lives, laughing and crying, raising children. It hurt you to think about them. And it wasn't necessary for them, not for him, not for Kit. Or was it? You couldn't tell; there was always a chance. But if only they could just forget it all, just live, there was so much to enjoy—

Kit handed him a fresh bourbon and soda, icy and with just a trace of lemon in it the way he liked it, and then curled up again on the couch, smiling at him.

"I'm sorry, angel," he said. "You must get pretty sick of hearing the same sad song over and over again."

"Not when you sing it, Cone."

"It's just that sometimes I chuck my mind out the nearest window and

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wonder why—"

There was a thump and a bang from the rear of the house. Conan Lang tasted his drink. That meant Rob was home. He listened, waiting. There was the hollow crack—that was the bat going into the corner. There was the heavy thud—that was the fielder's glove.

"That's why," Kit said.

Conan Lang nodded and picked up the first book off the floor.

Three days later, Conan Lang went up the white steps, presented his credentials, and walked into the Buzzard's Cage. The place made him nervous. Irritated with himself, he paused deliberately and lit his pipe before going on. The Cage seemed cold, inhuman. And the Buzzard—

He shouldn't feel that way, he told himself, again offering his identification before entering the lift to the Nest. Intellectually, he understood cybernetics; there was nothing supernatural about it. The Cage was just a machine, for all its powers, even if the Buzzard did sometimes seem more—or perhaps less—than a man. Still, the place gave him the creeps. A vast thinking machine, filling a huge building, a brain beside which his own was as nothing. Of course, men had built it. Men made guns, too, but the knowledge was scant comfort when you looked into a metallic muzzle and someone pulled the trigger.

"Lang," he said to himself, "you're headed for the giggle ward."

He smiled then, knowing it wasn't so. Imagination was a prime requisite for his job, and he just had more than his share. It got in the way sometimes, but it was a part of him and that was that.

Conan Lang waded through a battery of attendants and security personnel and finally reached the Nest. He opened the door and stepped into the small, dark room. There, behind the desk where he always was, perched the Buzzard.

"Hello, Dr. Gottleib," said Conan Lang.

The man behind the desk eyed him silently. His name was Fritz Gottleib, but he had been tagged the Buzzard long ago. No one used the name to his face, and it was impossible to tell whether or not the name amused him. He spoke but seldom, and his appearance, even after you got used to it, was startling. Fritz Gottleib was squat and completely bald. He always dressed in black and his heavy eyebrows were like horizontal splashes of ink against the whiteness of his face. The Buzzard analogy, thought Conan Lang, was more than understandable; it was inevitable. The man sat high in his tower, in his Nest of controls, brooding over a machine that perhaps he alone fully understood. Alone. He always seemed alone, no matter how many people surrounded him. His was a life apart, a life whose vital force pulsed in the shifting lights

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of the tubes of a great machine.

"Dr. Lang," he acknowledged, unmoving, his voice sibilant, almost a hiss.

Conan Lang puffed on his pipe and dropped into the chair across from Gottleib. He had dealt with the Buzzard before and most of the shock had worn off. You could get used to anything, he supposed. Man was a very adaptable animal.

"The smoke doesn't bother you, I hope?"

Gottleib did not comment. He simply stared at him, his dark eyes unblinking. Like looking at a piece of meat, thought Conan Lang.

"Well," he said, trying again, "I guess you know what I'm here for."

"You waste words," Fritz Gottleib hissed.

"I hadn't realized they were in short supply," Lang replied, smiling. The Buzzard was irritating, but he could see the justice in the man's remark. It *was* curious the number of useless things that were said all the time—useless, at any rate, from a purely communicative point of view. It would have been sheerly incredible for Gottleib—who after all had been checking his results in the computer—*not* to have known the nature of his mission.

"O.K.," said Lang, "what's the verdict?"

Fritz Gottleib fingered a square card in his surprisingly long-fingered hands, seeming to hover over it like a bird of prey.

"It checks out," he said sibilantly, his voice low and hard to hear. "Your plan will achieve the desired transfer in Sirius Ten, and the transfer integrates positively with the Plan."

"Anything else? Anything I should know?"

"We should all know many more things than we do, Dr. Lang."

"Um-m-m. But that was all the machine said with respect to my proposed plan of operations?"

"That was all."

Conan Lang sat back, watching Gottleib. A strange man. But he commanded respect.

"I'd like to get hold of that baby sometime," he said easily. "I've got a question or two of my own."

"Sometimes it is best not to know the answers to one's questions, Dr. Lang."

"No. But I'd like to have a shot at it all the same. Don't tell the security boys I said that; they'd string me up by the toes."

"Perhaps one day, Dr. Lang. When you are old like me."

Conan Lang stood up, cupping his pipe in his hand. "I guess that's all," he said.

"Yes," said Fritz Gottleib.

"See you around."

No answer. Cold shadows seemed to fill the room.

Conan Lang turned and left the way he had come. Behind him, drilling into his back, he could feel the eyes of

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Fritz Gottleib following him, cold and deep like the frozen waters of an arctic sea.

The ship stood on Earth but she was not of Earth. She was poised, a mighty lance of silver, a creature of the deeps. She waited, impatient, while Conan Lang slowly walked across the vast duralloy tarmac of Space One, Admiral White at his side. The sun was bright in a clean blue sky. It touched the ship with lambent flame and warmed Conan Lang's shoulders under his uniform. A slight puff of breeze rustled across the spaceport, pushing along a stray scrap of white paper ahead of it.

"Here we go again," said Conan Lang.

"That's what you get for being good," the admiral said with a smile. "You get good enough and you'll get my job—which ought to be a grim enough prospect even for you. If you're smart, you'll botch this job six ways from Sunday and then we'll have to give you a rest."

"Yeah—play a little joke, strictly for laughs, and give 'em an atom bomb or two to stick on the ends of their hatchets. Or take 'em back to the caves. There are plenty of delicious possibilities."

The two men walked on, toward the silver ship.

"Everything's set, I suppose?" asked Conan Lang.

"Yep. Your staff is already on board and the stuff is loaded."

"Any further instructions?"

"No—you know your business or you wouldn't be going. Just try to make it as quick as you can, Cone. They're getting warm over on Research on that integration-acceleration principle for correlating data—it's going to be big and I'll want you around when it breaks."

Conan Lang grinned. "What happens if I just up and disappear one day, Nels? Does the galaxy moan and lie down and quit?"

"Search me," said Admiral Nelson White. "But don't take any more risks than you absolutely have to. Don't get the idea that you're indispensable, either. It's just that it's tiresome to break in new men."

"I'll try to stay alive if you're positive that's what you want."

They approached the ship. Kit and Rob were waiting. The admiral touched his cap and moved on, leaving Conan Lang alone with his family. Kit was lovely—she always was, Conan Lang thought. He couldn't imagine a life without her.

"Bye, darlin'," he whispered, taking her in his arms. "One of these days I'm coming back and I'm never going to leave you again."

"This is till then," Kit said softly and kissed him for keeps.

Much later, Conan Lang released her and shook hands with his son.

"So long, old-timer," he said.

"Hurry back, Dad," Rob said,

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trying not to cry.

Conan Lang turned and joined Admiral White at the star cruiser. He did not look back.

"Good luck, Cone," the admiral said, patting him on the back. "I'll keep the medals warm and a light in the cabin window."

"O.K., Nels," said Conan Lang.

He swung aboard the great ship and stepped into the lift. There was a muted hum of machinery as the car whispered up through the pneumatic tube, up into the hollowness of the ship. Already it seemed to Conan Lang that he had left Earth far behind him. The endless loneliness of the star trails rode up with him in the humming lift.

The ship rested, quiescent, on Earth. Ahead of her, calling to her, the stars flamed coldly in an infinite sea of night.

II.

Conan Lang walked down the long white corridor to the afterhold, his footsteps muffled and almost inaudible in the murmur of the atomics. It *would* be a long white corridor, he thought to himself. Wherever man went, there went the long white corridors—offices, hospitals, command posts. It was almost as if he had spent half a lifetime walking through long white corridors, and now here was yet another one—cold and antiseptic, hanging in space eight light-years from Earth.

"Halt."

"Lang here," he told the Fleetman. "Kindly point that thing the other way."

"Identification, please."

Lang sighed and handed it over. The man should know him by now; after all, the ship was on his mission, and he was hardly a subversive character. Still, orders were orders—a principle that covered a multitude of sins. And they couldn't afford to take chances, not *any* chances.

"All right, sir," the Fleetman said, returning the identification. "Sorry to bother you."

"Forget it," said Conan Lang. "Keep your eye peeled for space pirates."

The guard smiled. "Who'd want to steal space, sir?" he asked. "It's free and I reckon there's enough to go around."

"Your inning," acknowledged Conan Lang, moving into the afterhold. The kid was already there.

"Hello, sir," said Andrew Irvin.

"Hi, Andy—and cut the 'sir,' what do you say? You make me feel like I should be extinct or embalmed or something."

The kid smiled almost shyly. Conan Lang had half expected to find him there in the hold; Andy was always poking around, asking questions, trying to learn. His quick brown eyes and alert carriage reminded Conan of a young hunting dog, frisking through

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the brush, perpetually on the verge of flushing the grandfather of all jack rabbits.

"It doesn't seem possible, does it?" asked the kid.

Conan Lang raised his eyebrows.

"All this, I mean," Andy Irvin said, gesturing at the neat brown sacks stacked row upon row in the brightly lighted hold. "To think that a couple of sacks of that stuff can remold a planet, change the lives of millions of people—"

"It's not just the sacks, Andy. It took man a good many hundreds of thousands of years to learn what to *do* with those sacks."

"Yes, sir," the kid said, hanging on every word.

"No 'sir,' remember? I'm not giving you a lecture, and you don't have to look attentive. I'm sure that elementary anthropology isn't *too* dumfounding to a guy who took honors at the Academy."

"Well—"

"Never mind." Conan Lang eyed him speculatively. The kid reminded him, almost too much, of someone else—a kid named Conan Lang who had started out on a great adventure himself too many years ago. "I . . . um-m-m . . . guess you know you're going to work with me on Ten."

Andy looked like Conan had just handed him a harem on a silver platter. "No, sir," he said. "I didn't know. Thank you, sir."

"The name is Conan."

"Yes, sir."

"Hellfire," said Conan Lang. How did you go about telling a kid that you were happy to have someone around with stars in his eyes again? Without sounding like a fool? The answer was simple—you didn't.

"I can't wait," Andy said. "To really *do* something at last—it's a great feeling. I hope I'll do O.K."

"It won't be long now, Andy. Twenty-four hours from now you and I go to work. The buggy ride is about over."

The two men fell silent then, looking at the neat brown rows of sacks, feeling the star ship tremble slightly under them with the thunder of her great atomics.

It was night on Sirius Ten—a hot, humid night with a single moon hanging like frozen fire in the darkness. A small patrol craft from the cruiser floated motionless in the night sky, her batteries pouring down a protective screen around the newly-cleared field. Conan Lang wiped the sweat from his forehead and washed his hands off in the clean river water that gurgled through the trench at his feet.

"That about does it, Andy," he said wearily. "Toss 'em a Four signal."

Andy Irvin turned the rheostat on his small control board to Four and flipped the switch. They waited, listening to the faint murmur of the night breeze off the river. There was no change, nothing that they could

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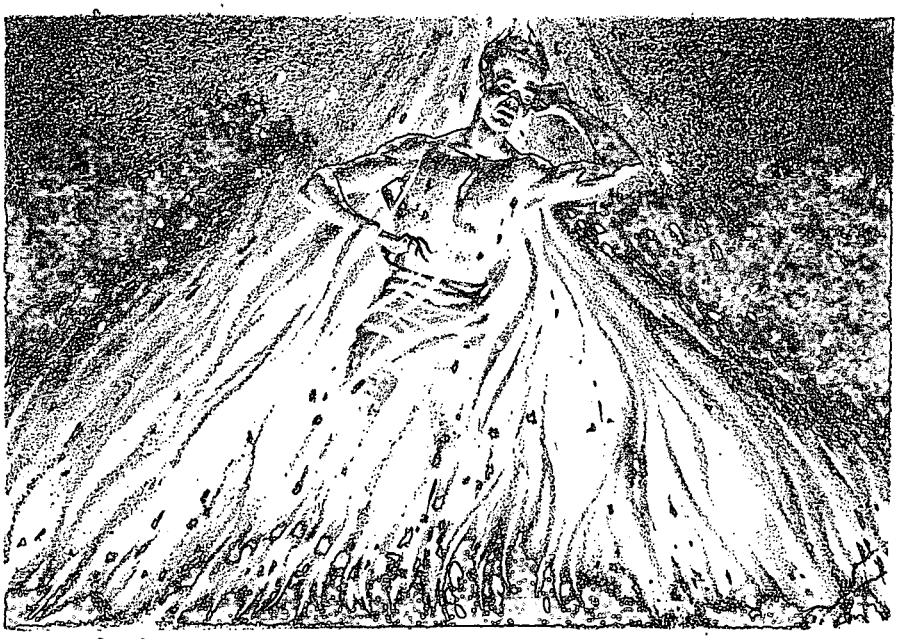

see, but they could almost feel the intense radiation pounding into the field from the patrol ship, seeping into the ground, accelerating by thousands of times the growth factor in the seeds.

"That's got it," said Conan Lang. "Give 'em release."

Andy shot the patrol craft the release signal and shut off his control board. The little ship seemed to hover uncertainly. There was a humming sound and a spot of intense white light in the sky. That was all. The ship was gone and they were alone.

"It's been a long night, kid," yawned Conan Lang. "We'd better get some sack time—we're liable to need it before morning."

"You go ahead," Andy Irvin said. "I'm not sleepy; the sunrise here ought to be something."

"Yeah," said Conan Lang. "The sunrise ought to be something."

He walked across the field and entered a structure that closely resembled a native hut in appearance but was actually quite, quite different. Too tired even to undress, he piled into bed with his clothes on and rested quietly in the darkness.

The strange, haunting, familiar-with-a-difference sounds of an alien world whispered around the hut on the soft, moist breeze from the sluggish river. Far away, an animal

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screamed hoarsely in the clogging brush. Conan Lang kept his eyes closed and tried not to think, but his mind ignored him. It went right on working, asking questions, demanding answers, bringing up into the light many memories that were good and some that were better forgotten.

"Kit," he said, very softly.

Tired as he was, he knew there would be no sleep for him that night.

The sunrise was a glory. The blue-white inferno of Sirius hung in the treetops across the field and then climbed into the morning sky, her white dwarf companion a smaller sun by her side. The low cumulus clouds were edged with flame—fiery red, pale blue, cool green. The fresh morning winds washed the field with air and already the young plants were out of the ground, thirsty for the sun. The chuckling water in the trenches sparkled in the light.

With the morning, the natives came.

"They're all around us," Conan Lang said quietly.

"I can't see them," whispered Andy Irvin, looking at the brush.

"They're there."

"Do you . . . expect trouble, sir?"

"Not yet, assuming we've got this deal figured right. They're more afraid of us than we are of them."

"What if we *don't* have it figured right?"

Conan Lang smiled. "Three guesses," he said.

The kid managed a wry grin. He was taking it well, Lang thought. He remembered how he'd felt—the first time. It didn't really hit you until that first day, and then it upped and kicked you in the teeth. Quite suddenly, it was all a very different proposition from the manuals and the viewers and the classrooms of the Academy. *Just you, all alone,* the alien breeze sighed in your ear. *You're all alone in the middle of nowhere,* the wind whispered through the trees. *Our eyes are watching you, our world is pressing you back, waiting. What do you know of us really? What good is your knowledge now?*

"What next?" Andy asked.

"Just tend the field, kid. And try to act like a ghost. You're an ancestor of those people watching us from the brush, remember. If we've got this figured wrong—if those survey reports were haywire somewhere, or if someone's been through here who didn't belong—you should have a little warning at least. They don't use blowguns or anything—just spears, and they'd prefer a hatchet. If there's trouble, you hightail it back to the hut *at once* and man the projector. That's all."

"I'm not so sure I care to be an ancestor," Andy Irvin muttered, picking up his hoe. "Not yet, anyhow." He moved off along a water trench, checking on the plants.

Conan Lang picked up his own hoe and set to work. He could feel the natives watching him, wondering,

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whispering to themselves. But he was careful not to look around him. He kept his head down and dug at the plants with his hoe, clearing the water channels. The plants were growing with astonishing rapidity, thanks to the dose of radiation. They should be mature in a week. And then—

The sun blazed down on his treated skin and the sweat rolled off his body in tiny rivulets. The field was strangely silent around him; there was only the gurgle of the water and the soft sigh of the humid breeze. His hoe chopped and slushed at the mud and his back was tired from bending over so long. It was too still, unnaturally still.

Behind that brush, back in the trees —a thousand eyes.

He did not look around. Step by step, he moved down the trench, under the hellish sun, working with his hoe.

The fire-burned days and the still, hushed nights alternated rapidly. On the morning of the third day, Andy Irvin found what they had been waiting for.

In the far corner of the field, placed on a rude wood platform about four feet high, there were three objects. There was a five-foot-square bark mat, neatly woven. There was a small animal that closely resembled a terrestrial pig, face down, its throat neatly slashed. And there was a child. It was a female baby, evidently not over a week old. It had been strangled to death.

"It's . . . different . . . when you see it for yourself," Andy said quietly, visibly shaken.

"You'll get used to it," said Conan Lang, his voice purposely flat and matter-of-fact. "Get the pig and the mat—and stop looking like a prohibitionist who just found a jug of joy water in the freezer. This is old stuff to ancestors."

"Old stuff," repeated Andy without conviction.

They carried the contents of the platform back to their hut and Conan Lang wrapped the body of the child in a cloth.

"We'll bury her tonight after dark," he said. "The pig we eat. It won't do any harm to sit on the mat where they can see us while we're eating it, either."

"Well," Andy muttered. "Glad to see you're not going to eat the baby, too."

"You never can tell," smiled Conan Lang. "We anthropologists are all crazy, or hadn't you heard?"

"I've heard," agreed Andy Irvin, getting his nerves under control again. "Where's the hot sauce?"

Conan Lang stepped back outside and picked up his hoe. The blazing double sun had already produced shimmering heat waves that danced like live things in the still air over the green field. The kid was going to be all right. He'd known it all along, of course—but you could never be *sure* of a man until you worked with him

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under field conditions. And a misfit, an unstable personality, was anything but a joke on an alien planet where unknowable forces hung in the balance.

"Let's see if I've got this thing figured straight," Andy said, puffing away on one of Conan's pipes. "The natives are afraid of us, and still they feel that they must make us an offering because we, as their supposed ancestors, control their lives. So they pick a system of dumb barter rather than sending out the usual contact man to ferret out kinship connections."

"You're O.K. so far," Conan Lang said. "I guess you've studied about the dumb barter systems used on Earth in the old days; it was used whenever trade took place between groups of markedly unequal strength, such as the African pygmies and trading vessels from the west. There's a fear factor involved."

"Yes, sir."

"Forget the 'sir.' I didn't mean to lecture. I think I'll start calling you Junior."

"Sorry. The bark mat is a unit in a reciprocal trade system and the pig is a sacred animal—I get that part of it. But the baby—that's terrible, Conan. After all, we caused that death in a way—"

"Afraid not," Conan Lang corrected him. "These people practice infanticide; it's part of their religion. If the preliminary reports were correct—and they've checked out so far—they kill all the female children born on the last three days of alternate months. There's an economic reason, too—not enough food to go around, and that's a pretty effective method of birth control. The baby would have been killed regardless—we had nothing to do with it."

"Still—"

"I know. But maybe she was the lucky one after all."

"I don't quite follow you there."

"Skip it—you'll find out soon enough."

"What are you going to leave them tonight?"

"Not sure yet," Conan Lang said. "We'll have to integrate with their value system, of course. We brought some mats, and I guess a good steel knife won't hurt things any. We'll worry about that later. Come on, farmer—back to work."

Andy Irvin picked up his hoe and followed Conan Lang into the field. The clear water bubbled softly as it flowed through the trenches. The growing plants sent their roots thirstily into the ground and the fresh green shoots stretched up like tentacles into the humid air of Sirius Ten.

That night, under the great yellow moon that swam far away and lonesome among the stars, they placed exchange gifts of their own on the platform. Next morning, the invisible traders had replaced them with four

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mats and another dead pig.

"No babies, anyhow," Andy Irvin said, puffing industriously on one of Conan's pipes. They had decided that cigarettes, as an unfamiliar cultural trait to the natives, were out. Now, with Andy taking with unholy enthusiasm to pipe smoking, Conan Lang was threatened with a shortage of tobacco. He watched the smoke from the kid's pipe with something less than ecstasy.

"We can have smoked ham," he observed.

"It was your idea," Andy grinned.

"Call me 'sir.'"

Andy laughed, relaxed now, and picked up the pig. Conan gathered up the somewhat cumbersome mats and followed him back into the hut. The hot, close sun was already burning his shoulders. The plants were green and healthy looking, and the air was a trifle fresher in the growing field.

"Now what?" Andy asked, standing outside the hut and letting the faint breeze cool him off as best it could.

"I figure we're about ready for an overt contact," Conan Lang said. "Everything has checked out beautifully so far, and the natives don't seem to be suspicious or hostile. We might as well get the ball rolling."

"The green branch, isn't it?"

"That's right."

They still did not get a glimpse of the natives throughout the steaming day, and that night they placed a single mat on the platform. On top of the mat they put a slim branch of green leaves, twisted around back on itself and tied loosely to form a circle. The green branch was by no means a universal symbol of peace, but, in this particular form, it chanced to be so on Sirius Ten. Conan Lang smiled a little. Man had found many curious things among the stars, and most of them were of just this unsensational but very useful sort.

By dawn, the mat and the circle branch were gone and the natives had left them nothing in return.

"Today's the day," Conan Lang said, rubbing the sleep out of his eyes. "They'll either give us the works or accept our offer. Nothing to do now but wait."

They picked up their hoes and went back into the field. Waiting can be the most difficult of all things, and the long, hot morning passed without incident. The two men ate their lunch in silence, thankful for the odorless injection that kept the swarming insects away from them. Late in the afternoon, when the long blue shadows of evening were already touching the green plants and the clean, flowing water, the natives came.

There were five of them and they appeared to be unarmed. One man walked slightly in advance of the others, a circular branch of green leaves in his hand. Conan Lang waited for them, with Andy standing by at

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his side. It was moments like this, he thought, that made you suddenly realize that you were all alone and a long, long way from friends. The natives came on steadily. Conan felt a surge of admiration for the young man who led them. From his point of view, he was walking into a situation filled with the terror of the supernatural, which was a very real part of his life. His steps did not falter. He would, Conan supposed, be the eldest son of the most powerful chief.

The natives stopped when they were three paces away. Their leader extended the circular green branch. "We would serve you, fathers from the mountains," the native said in his own tongue.

Conan Lang stepped forward and received the branch. "We are brothers," he replied in the same language, "and we would be your friends."

The native smiled, his teeth very white. "I am Ren," he said. "I am your brother."

Conan Lang kept his face expressionless, but deep within him a dark regret and sadness coursed like ice through his veins.

It had begun again.

III.

For many days, Conan Lang listened to the Oripesh natives preparing for the feast. Their small village, only a quarter of a mile from the field, was alive with excitement. The women prepared great piles of the staple rice-fruit and broiled river fish in great green leaves on hot coals. The men chanted and danced interminably, cleansing the village by ritual for the coming visitation, while the children, forgotten for once, played on the banks of the river. On the appointed day, Conan Lang walked into the village with Andy Irvin at his side.

It was a crude village, necessarily so because of its transient nature. But it was not dirty. The natives watched the two men with awe, but they did not seem unfriendly. The supernatural was for them always just on the other side of the hill, hidden in the night, and now it was among them, in the open. That was all. And what, after all, thought Conan Lang, could have seemed more supernatural to them than a silver ship that dropped out of the stars? What was supernatural depended on one's point of view—and on how much one happened to know about what was *natural*.

The box he carried was heavy, and it took both arms to handle it. He watched Andy puffing at his side and smiled.

"Stick with it, kid," he said, walking steadily through the watching natives. "You may earn your pay yet."

Andy muttered something under his breath and blinked to get the sweat out of his eyes.

When they reached the clearing in the center of the village, they stopped

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and put their boxes down. Ren, the eldest son of the chief Ra Renne, approached them at once and offered them a drink from a large wooden bowl. Conan drank and passed the container on to Andy, who grinned broadly and took a long swallow of the warm fluid. It was sweet, although not too sweet, and it burned pleasantly on the way down. It was, Conan decided instantly, a great improvement over some native fermented horrors he had been subjected to in times past.

The natives gathered around them in a great circle. There must have been nearly five hundred of them—far more than the small village could accommodate for any length of time.

"We're celebrities," Conan Lang whispered out of the side of his mouth as he waited to be presented ceremonially to the chiefs.

"You want my autograph?" hissed Andy, his face just a trifle flushed from the drink he had taken. "I make a real fine *X*."

The feast followed a pattern familiar to Conan Lang. They were presented ceremonially to the tribe, having identified themselves as ancestors of four generations ago, thus making themselves kin to virtually all the tribe with their complicated lineage system, and also making refutation impossible since no one remembered that far back. They were seated with the chiefs, and ate the ritual feast rapidly. The food was good, and Conan Lang was interested in getting a good taste of the ricefruit plant, which was the basic food staple of the Oripesh.

After the eating came the drinking, and after the drinking the dancing. The Oripesh were not a musical people, and they had no drums. The men and the women danced apart from each other, each one doing an individual dance—which he owned, just as the men from Earth owned material property—to his own rhythm pattern. Conan Lang and Andy Irvin contented themselves with watching, not trusting themselves to improvise an authentic dance. They were aware that their conduct was at variance with the somewhat impulsive conduct usually attributed to ancestors in native folklore, but that was a chance they had to take. Conan was very conscious of one old chief who watched him closely with narrowed eyes.

Conan ignored him, enjoying the dancers. The Oripesh seemed to be a happy people, although short on material wealth. Conan Lang almost envied them as they danced—envied them for their simple lives and envied them their ability to enjoy it, an ability that civilized man had left by the wayside in his climb up the ladder. Climb—or descent? Conan Lang sometimes wondered.

Ren came over, his color high with the excitement of the dance. Great fires were burning now, and Conan noticed with surprise that it was night.

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"That is Loe," he said, pointing. "My *am-ren*, my bride-to-be." His voice was filled with pride.

Conan Lang followed his gesture and saw the girl. Her name was a native word roughly translatable as *fawn*, and she was well named. Loe was a slim, very shy girl of really striking beauty. She danced with diffidence, looking into Ren's eyes. The two were obviously, almost painfully, in love—love being a part of the culture of the Oripesh. It was difficult to realize, sometimes, even after years of personal experience, that there were whole worlds of basically humanoid peoples where the very concept of romantic love did not exist. Conan Lang smiled. Loe was, if anything, a trifle *too* beautiful for his taste. Dancing there, with the yellow moon in her hair, moving gracefully with the leaping shadows from the crackling fires, she was ethereal, a fantasy, like a painting of a woman from another, unattainable century.

"We would give gifts to the chiefs," Conan Lang said finally. "Your Loe—she is very beautiful."

Ren smiled, quickly grateful, and summoned the chiefs. Conan Lang rose to greet them, signaling to Andy to break open the boxes. The chiefs watched intently. Conan Lang did not speak. He waited until Andy had opened both boxes and then pointed to them.

"They are yours, my brothers," he said.

The natives pressed forward. A chief picked the first object out of the box and stared at it in disbelief. The shadows flickered eerily and the night wind sighed through the village. He held the object up to the light and there was a gasp of astonishment.

The object was a ricefruit—a ricefruit the likes of which had never before been seen on Sirius Ten. It was round, fully a foot in diameter, and of a lush, ripe consistency. It made the potato-sized ricefruits of the Oripesh seem puny by comparison.

It was then that Conan Lang exploded his bombshell.

"We have come back to show you, our brothers, how to grow the great ricefruit," he said. "You can grow them over and over again, *in the same field*. You will never have to move your village again."

The natives stared at him in wonder, moving back a little in fear.

"It cannot be done," a chief whispered. "The ricefruit devours the land—every year we must move or perish."

"That is over now," Conan Lang said. "We have come to show you the way."

The dancing had stopped. The natives waited, nervous, suddenly uncertain. The yellow moon watched through the trees. As though someone had flipped a switch, sound disappeared. There was silence. The great ricefruit was magic. They looked at

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the two men as though seeing them for the first time. This was not the way of the past, not the way of the ancestors. This was something completely *new* and they found themselves lost, without precedent for action. Ren alone smiled at them, and even he had fear in his eyes.

Conan Lang waited tensely. He must make no move; this was the crisis point. Andy stood at his side, very still, hardly breathing.

A native walked solemnly into the silence, carrying a young pig under his arm. Conan Lang watched him narrowly. The man was obviously a shaman, a witch doctor, and his trembling body and too-bright eyes were all too clear an indication of why he had been chosen for his role in the society.

With a swiftness of motion that was numbing, the shaman slit the pig's throat with a stone knife. At once he cut the body open. The blood stained his body with crimson. His long, thin hands poked into the entrails. He looked up, his eyes wild.

"They are not ancestors," he screamed, his voice high like an hysterical woman's. "They have come to do us evil!"

The very air was taut with tension.

"No," Conan Lang said loudly, keeping his voice clear and confident. "The *barath-tui*, the shaman, has been bewitched by sorcerers! Take care that you do not offend your ancestors!"

Conan Lang stood very still, fighting to keep the alarm off his face. He and Andy were helpless here, and he knew it. They were without weapons of any sort—the native loin cloth being a poor place to conceal firearms. There was nothing they could do—they had miscalculated, moved too swiftly, and now they were paying the price.

"We are your brothers," he said into the ominous silence. "We are your fathers and your father's fathers. There are others who watch."

The flames leaped and danced in the stillness. An old man stepped forward. It was the chief that Conan had noticed watching him before.

"You say you are our brothers who have taken the long journey," the old chief said. "That is good. We would see you walk through the fire."

The wind sighed in the trees. Without a moment's hesitation, Conan Lang turned and walked swiftly toward the flames that crackled and hissed in the great stone fire pits.

There was nothing else in all the world except the flickering tongues of orange flame that licked nearer and nearer to his face. He saw the red, pulsing coals waiting beneath the twisted black branches in the fire and he closed his eyes. The heat singed his eyebrows and he could feel his hair shrivel and start to burn.

Conan Lang kept moving, and moved fast. He twisted a rigid clamp on his mind and refused to feel pain.

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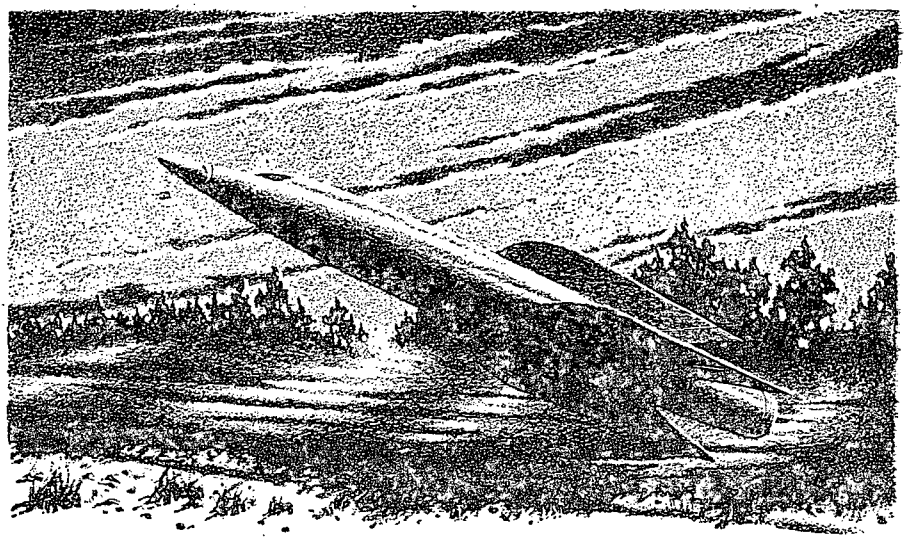

He wrenched his mind out of his body, thinking as he had been trained to think, until it was as if his mind floated a thing apart, free in the air, looking down upon the body of Conan Lang walking through hell.

He knew that one of the attributes of the Oripesh ancestor gods was that they could walk through flame without injury—a fairly common myth pattern. He had known it before he left Earth. He should have been prepared, he knew that. But man was not perfect, which would have been a dangerous flaw had it not been his most valuable characteristic.

He saw that his legs were black and blistered and he smelled the suffocating smell of burning flesh. The smoke was in his head, in his lungs, everywhere, choking him. Some of the pain was coming through—

He was out. He felt Andy's hands beating out the rivulets of flame that clung to his body and he forced the clean, pure air of night into his sick lungs. The pain, the pain—

"Stick with it, Cone," Andy whispered in his ear. "Stick with it."

Conan Lang managed to open his eyes and stared blankly into a hot-red haze. The haze cleared and he was faintly surprised to find that he could still see. The natives were awestruck with fear—they had angered their gods and death was in the air. Conan Lang knew that the shaman who had denounced him would quite probably be dead of fear before the night was over—if he did not die before then of some less subtle malady. He had endangered the tribe without reason,

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and he would pay with his life.

Conan Lang kept his face expressionless. Inside, he was on fire. Water, he had to have water, cold water—

Ren came to him, his eyes filled with pain. "I am sorry, my brother," he whispered. "For my people, I am sorry."

"It is all right, Ren," Conan Lang heard his voice say steadily. "I am, of course, unharmed."

Conan Lang touched Andy's arm and moved across to the chiefs. He felt Andy standing behind him, ready to catch him, just in case. He could feel nothing in his feet—quite suddenly, he was convinced that he was standing on the charred stumps of his legs and he fought to keep from looking down to make sure he still had feet.

"You have doubted your brothers who have come far to help their people," he said quietly, looking directly into the eyes of the old chief who had sent him into the flames. "We are disappointed in our people—there are sorcerers at work among you, and they must be destroyed. We leave you now. If you anger your brothers again, the Oripesh shall cease to be."

He did not wait for an answer but turned and started away from the clearing, back through the village. Andy was at his side. Conan Lang set his teeth and moved at a steady pace. He must have no help until they were beyond the village; the natives must not suspect—

He walked on. The great yellow moon was high in the night sky, and there was the face of Loe with stars in her hair. The moon shuddered and burst into flame and he heard himself laughing. He bit his lips until the blood came and kept going, into the darkness, into nothing. The pain clawed at his body.

They were through the village. Something snapped in Conan Lang—the steel clamp that had carried him through a nightmare parted with a clean *ping*. There was emptiness, space. Conan Lang collapsed. He felt Andy's arm around him, holding him up.

"You'll have to carry me, kid," he whispered. "I can't walk at all."

Andy Irvin picked him up in his arms and set out through the night.

"It should have been me," he said in bitter self-reproach. "It should have been me."

Conan Lang closed his eyes and, at last, nothing mattered any more, and there was only darkness.

A week later, Conan Lang stood in the dawn of Sirius Ten, watching the great double sun lift above the horizon and chase the shadows from the green field that they had carved out of the wilderness. He was still a very sick man, but Andy had pulled him through as best he could and now the star cruiser was coming in to pick him up and leave a replacement with the kid.

The fresh leaves of the ricefruit plants were shoulder high and the water in the irrigation trenches chuckled

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cleanly, waiting for the full fury of the sun. The tenuous, almost hesistant breeze crawled through the still air.

Conan Lang watched the green plants silently. The words of the dead *barath-tui*, the shaman, echoed in his brain. *They are not ancestors*, the man had screamed. *They have come to do us evil!*

They have come to do us evil . . .

How could he have known—with only a pig and a stone knife? A crazy shaman working the discredited magic of divination—and he had been *right.* Coincidence? Yes, of course. There was no other way to look at it, no other *sane* way. Conan Lang smiled weakly. He remembered reading about the Snake Dance of the Hopi, long ago back on Earth. The Snake Dance had been a rain-making ceremonial, and invariably when the very early anthropologists had attended the dance they had got drenched on the way home. It was only coincidence and good timing, of course, but it was difficult to tell yourself that when the rain began to pour.

"Here she comes," said Andy Irvin.

There was a splitting whistle and then a soft hum as a small patrol ship settled down toward the field on her anti-gravs. She hung there in the dawn like a little silver fish seen through the glassite walls of a great aquarium, and Conan Lang could sense what he could not see—the massive bulk of the sleek star cruiser waiting out in space.

The patrol ship came down out of the sky and hovered a few feet off the ground. A man swung down out of the outlift and waved. Conan Lang recognized him as Julio Medina, who had been lifted out of another sector of Sirius Ten to come in and replace him with Andy. The ricefruit was green and fresh in the field and it hurt Conan to leave his job unfinished. There wasn't a great deal to do now until the check, of course, and Julio was a very competent and experienced man, but there was still so much that could go wrong, so much that you could never anticipate—

And he didn't want anything to happen to the kid.

"So long, Cone," Andy said, his voice very quiet. "And—thanks. I won't forget what you did."

Conan Lang leaned on Andy's arm and moved toward the ship. "I'll be back, Andy," he said, trying to keep the weight off his feet. "Hold the fort—I know it'll be in good hands."

Conan Lang shook hands with Julio and then Julio and Andy helped him into the outlift. He had time for a brief wave and a final glimpse of the green field under the fiery sun, and then he was inside the patrol ship. They had somehow rigged up a bunk for him in the cramped quarters, and he collapsed into it gratefully.

"Home, James," he whispered, trying not to think about what would happen if they could not save his legs.

Conan Lang closed his eyes and lay

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very still, feeling the ship pulse and surge as it carried him out into the dark sea from which he had come.

IV.

The doctors saved his legs, but years were to pass before Conan Lang again set foot upon Earth. Space was vast and star cruisers comparatively few. In addition, star ships were fabulously expensive to operate—it was out of the question for a ship on a mission to make the long run from Sirius to Sol for the sake of one man. Conan Lang became the prize patient of the ship medics and he stayed with the star cruiser as it operated in the Sirius area.

A star cruiser on operations was never dull and there were books to read and reports to write. Conan Lang curbed his impatience and made the best of the situation. The local treatments applied by Andy had been effective enough so that the ship medics were able to regenerate his burned tissue, and it was only a question of time before he would be strong again.

The star cruiser worked efficiently and effectively in support of Administration units in the Sirius area, sliding through the blackness of space like some leviathan of the deep, and Conan Lang rested and made himself as useful as he could. He often went up into the control room and stood watching the visiplate that looked out upon the great emptiness of space. Somewhere, on a far shore of that mighty sea, was a tiny planet called Earth. There, the air was cool and fresh under the pines and the beauty of the world, once you got away from it and could see it in perspective, was fantastic. There were Rob and Kit, friendship and tears and laughter.

There was home.

While his body healed, Conan Lang lived on the star cruiser. There was plenty of time to think. Even for a race with a life span of almost two hundred years, the days and the weeks and the months can seem interminable. He asked himself all the old questions, examined all the old answers. Here he was, on a star ship light-years from home, his body burned, waiting to go back to Sirius Ten to change the life of a planet. What thin shreds of chance, what strange webs of history, had put him there? When you added up the life of Conan Lang, of all the Conan Langs, what did you get? Where was Earth going, that pebble that hurled its puny challenge at the infinite?

Sometimes, it was all hard to believe.

It had all started, he supposed, with cybernetics. Of course, cybernetics itself was but the logical outgrowth of a long cultural and technological trend. For centuries, man's ally, the machine, had helped him physically in his adjustment to his environment. What more natural than that it should

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one day help him mentally as well? There was really nothing sinister about thinking machines, except to a certain breed of perpetually gloomy poets who were unable to realize that values were never destroyed but were simply molded into new patterns in the evolution of culture. No, thinking machines were fine and comforting—for a while.

But with the dawn of space travel, man's comfortable, complacent progress toward a vague somewhere was suddenly knocked into a cocked hat. Man's horizons exploded to the rims of the universe with the perfection of the star drive—he was no longer living *on* a world but *in* an inhabited universe. His bickerings and absurdities and wars were seen as the petty things they were—and man in a few tremendous years emerged at last from adolescence.

Science gave to men a life span of nearly two hundred active years and gave him the key to forever. But there was a catch, a fearful catch. Man, who had had all he could do to survive the conflicts of local groups of his own species, was suddenly faced with the staggering prospect of living in an inhabited *universe*. He had known, of course, about the millions and millions of stars, about the infinity of planets, about the distant galaxies that swam like island universes through the dark seas of space. But he had known about them as figures on a page, as photographs, as dots of unwinking light in a telescope. They had been curiosities, a stimulus to the imagination. Now they were vital parts of his life, factors to be reckoned with in the struggle for existence. In the universe were incredible numbers of integers to be equated in the problem of survival—*and the mind of man could not even learn them all, much less form intelligent conclusions about future actions.*

And so, inevitably, man turned again to the machine. But this time there was a difference. The machine was the only instrument capable of handling the data—and man in a million years could not even check its most elementary conclusions. Man fed in the facts, the machine reached the conclusions, and man acted upon them—not through choice, but simply because he had no other guide he could trust.

Men operated the machines—but the machines operated men.

The science of cybernetics expanded by leaps and bounds. Men made machines to develop new machines. The great mechanical brains grew so complex that only a few men could even pretend to understand them. Looking at them, it was virtually impossible to believe that they had been born in the minds of men.

The machines did not interfere in the everyday routine of living—man would never submit to that, and in problems which he could understand he was still the best judge of his own happiness. It was in the larger problems, the problems of man's destiny in

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the universe in which he found himself, that the great brains were beyond value. For the machines could integrate trends, patterns, and complexes of the known worlds and go on from there to extrapolate into the unknown. The machines could, in very general terms, predict the outcome of any given set of circumstances. They could, in a very real sense, see into the future. They could see where Earth was headed.

And Earth was headed for disaster.

The machines were infallible. They dealt not with short-term probabilities, but with long-range certainties. And they stated flatly that, given the equation of the known universe, Earth would be destroyed in a matter of centuries. There was only one thing to do—man must change the equation.

It was difficult for man, so recently Earthbound, to really *think* and *act* in terms of an inhabited universe. But the machines showed conclusively that in as yet inaccessible galaxies life had evolved that was physically and mentally hostile to that of Earth. A collision of the two life-forms would come about within a thousand years, and a life-and-death struggle was inevitable. The facts were all too plain—Earth would lose and the human race would be exterminated.

Unless the equation could be changed.

It was a question of preparing the galaxy for combat. The struggle would be a long one, and factors of reserves, replacements, different cultural approaches to common problems, planets in varying stages of development, would be important. It was like a cosmic chess game, with worlds aligning themselves on a monstrous board. In battles of galactic dimensions, the outcome would be determined by centuries of preparation before contact was even made; it was not a romantic question of heroic spaceships and iron-jawed men of action, but rather one of the cultural, psychological, technological, and individual patterns which each side could bring to bear—patterns which were the outgrowths of millennia of slow evolution and development.

Earth was ready, or would be by the time contact came. But the rest of the galaxy—or at any rate as much of it as they had managed to explore—was not, and would not be. The human race was found somewhere on most of the star systems within the galaxy, but not one of them was as far advanced as were the men from Earth. That was why Earth had never been contacted from space—indeed, it was the only possible explanation, at least in retrospect. And the other galaxies, with their totally alien and forever nonunderstandable principles, were not interested in undeveloped cultures.

The problem thus became one of accelerating the cultural evolution of Earth's sister planets by means of diffusion, in order to build them up into an effective totality to combat the

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coming challenge. And it had to be done in such a manner that the natives of the planets were completely unaware that they were not the masters of their own destiny, since such a concept produced cultural stagnation and introduced corrupting elements into the planetary configurations. It had often been argued that Earth herself was in such a position, being controlled by the machines, but such was not the case—their choice had been a rational one, and they could abandon the machines at any time at their own risk.

Or so, at any rate, argued the thinkers of Earth.

The long months lengthened into years and, inactive though he was, Conan Lang spent his time well. It was good to have a chance to relax and think things through; it was good for the soul to stop midway in life and take stock. Almost, it was possible to make sense out of things, and the frantic rush to nowhere lost some of its shrieking senselessness.

Conan Lang smiled without humor. That was all very well for him, but what about the natives whose lives they were uprooting? Of course, they were human beings, too, and stood to lose as much as anyone in the long run—but they did not understand the problem, *could* not understand it. The plain truth was that they were being used—used for their own benefit as well as that of others, but used none the less.

It was true that primitive life was no bed of roses—it was not as if, Conan Lang assured himself, the men from Earth were slithering, serpent-like, into an idyllic Garden of Eden. All they were doing was to accelerate the normal rate of change for a given planet. But this caused far-reaching changes in the culture as it existed—it threw some people to the dogs and elevated others to commanding positions. This was perhaps no more than was done by life itself, and possibly with better reason, but you couldn't tell yourself that when you had to face the eyes of a man who had gone from ruler to slave because of what you had done.

The real difficulty was that you couldn't *see* the threat. It was there all right—a menace besides which all the conflicts of the human race were as nothing. But it had always been difficult for men to work before the last possible moment, to prepare rather than just sit back and hope for the best. That man was working now as he had never worked before, in the face of an unseen threat from out of the stars, even to save his own existence, was a monument to his hard-won maturity. It would have been so easy, so pleasant, just to take it easy and enjoy a safe and comfortable life—and beyond question it would have meant the end of the human race.

Of one thing, Conan Lang was

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sure—whenever man stopped trying, stopped working and dreaming and reaching for impossible heights, whenever he settled back in complacency, on that day he shrunk to atrophied insignificance.

Sirius Ten had been a relatively easy project because of the planet-wide nature of its culture. Sirius Ten had only one huge land mass, and one great sea. The natives all shared basically the same life pattern, built around the cultivation of dry ricefruit, and the teams of the Applied Process Corps were faced with only one major problem rather than hundreds of them as was more often the case. It was true that certain peoples who lived on the shores of the sea, together with one island group, had a variant culture based on fishing, but these were insignificant numerically and could for practical purposes be ignored.

The dry ricefruit was grown by a cutting and burning method, under which a field gave a good yield only once before the land was exhausted and the people had to move on. Under these conditions, individual ownership of land never developed, and there were no inequalities of wealth to speak of. The joint families worked different fields every year, and since there was no market for a surplus there was no effort made to cultivate more land than was really needed.

The Oripesh natives of Sirius Ten had a well-developed cult of ancestor worship, thinking of their dead as always watching over them and guiding their steps. Since whatever the ancestors did automatically had the sanction of tradition behind it, it was through them that the Corps had decided to work—it being simply a question of palming off Corps Agents as ancestors come back from their dwelling place in the mountains to help their people. With careful preparations and experienced men, this had not proved overly difficult—but there were always miscalculations, accidents. Men were not like chemicals, and they did not always react as they were supposed to react. There was always an individual variable to be considered. That was why if a Corps Agent lived long enough to retire you knew both that he knew his stuff and that he had had more than his share of plain old-fashioned luck.

Sirius Ten had to be shifted from Stage Four to Stage Five. This was a staggering change in economics, social structure, and technology—one that had taken men on Earth many centuries to accomplish. The men of the Applied Process Corps had to do it in a matter of a few years. And so they set out, armed with a variety of ricefruit that grew well in marshy land and a sound knowledge of irrigation.

With such a lever they could move a world.

It was three years to the day when

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Conan Lang returned to Sirius Ten. The patrol ship came in on her anti-gravs and he waited eagerly for the outlift shaft to open. His heart was pounding in his chest and his lips were dry—it was almost like coming home again.

He swung his newly-strong body into the outlift and came out of it in the green field he had planted so long ago. He took a deep breath of the familiar humid air and grinned broadly at the hot, burning sun over his head. It *was* good to be back—back at a place like so many other places he had known, places that were as close to a home as any he could ever have without Kit. The breeze whispered softly through the green ricefruit and he waved at Julio who came running across the field to meet him. These were, he knew, his kind of people—and he had missed Andy all these years.

"Hey there, Julio!" he laughed, shaking Medina's hand. "How goes it?"

"Pretty good, Conan," Julio said quietly. "Pretty good."

"The kid — how's the kid?"

"Andy is dead," said Julio Medina.

Conan Lang stood stock-still while an iron fist smacked into his stomach with cold, monotonous precision. Andy dead. It could not be, *could not be.* There had been no word, nothing. He clenched his fists. It couldn't be true.

But it was. He knew that with ice cold certainty.

"It just happened the other day, Conan," Julio said. "He was a fine boy."

Conan Lang couldn't speak. *The whole planet*, his mind tortured him. *The whole stinking planet isn't worth Andy's life.*

"It was an accident," Julio said, his voice carefully matter-of-fact. "Warfare has sprung up between the rival

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villages like we figured. Andy was out after information and he got between them—he was hit by mistake with a spear. He never had a chance, but he managed to walk away and get back here before he died. The Oripesh don't suspect that he wasn't a god and could die just like anyone else. He saved the rest of us by coming back here—that's something."

"Yeah," Conan Lang said bitterly, "that's something."

"I buried him here in the field," Julio Medina went on. "I thought he'd like that. He . . . said good-by to you, Conan."

It had been a long time since Conan Lang had had tears in his eyes. He turned without a word and walked away, across the green field and into the hut where he could be alone.

V.

From that time on, by unspoken mutual consent, the two men never again mentioned the kid's name. They gave him the best possible write-up in their reports, and that was all that they could ever do for Andy Irvin.

"I think we've about done it here, Conan," Julio told him. "I'd like to have you make your own check and see if you come up with the same stuff I did. There's a lull in the raiding right now—the natives are worried because that spear hit an ancestor by mistake and they're pretty well occupied with rituals designed to make us feel better about the whole thing. You shouldn't have any trouble, and that ought to about wind things up."

Conan Lang nodded. "It'll be good to get home again, eh Julio?"

"Yes, you know that — and for you it should be for keeps."

Conan Lang raised his eyebrows.

"It's no secret that you're due to be kicked upstairs," Julio said. "I rather think this is your last field job."

"Well, it's a nice theory anyhow."

"You remember all us old men out here in the stars, the slave labor of the Process Corps. Bring us all home, Conan, and we'll sit around in the shade and drink cold wine and fish and tell lies to each other."

"Consider it done," said Conan Lang. "And I'll give you all some more medals."

"I've got medals."

"Can't have too many medals, Julio. They're good for what ails you."

"They're not good for what ails *me*," said Julio Medina.

Conan Lang smiled and fired up his pipe. *The kid*, his mind whispered. *The kid liked that pipe.* He thrust the thought from his mind. A man had to take death in his stride out here, he told himself. Even when it was a kid who reminded you of yourself a million years ago—

A million years ago.

"I'll start in tomorrow," Conan Lang said, puffing on his pipe. "Do

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you know Ren, Julio?"

"The chief's son? Yes."

"How did he come out?"

"Not well, Conan. He lost his woman, Loe, to one of the men we made wealthy; he has not been the same since."

"We're great people, Julio."

"Yes."

Conan Lang was silent then and the two men stood together in the warm evening air, watching the great double sun float slowly down below the horizon as the long black shadows came marching up from the far edge of the world.

Next morning, Conan Lang was off with the dawn on his final check. He pretty well knew what he would find—Julio Medina was an experienced hand and his information was reliable. But it was always a shock when you saw it for yourself. You never got used to it. To think that such a tiny, seemingly insignificant thing could change a planet beyond recognition. A ricefruit—

It was already hot when he passed the native fields. Their ricefruit plants were tall and healthy, and their irrigation channels well constructed. He shook his head and walked on to the native village.

Where the open, crude, friendly village had stood there was a great log wall. In front of the wall was a series of deep and ugly-looking moats. Behind the wall, he could see the tops of sturdy wooden buildings, a far cry from the huts of only a few short years ago. Conan Lang made no attempt at concealment but walked openly up to the moats and crossed them on a log bridge. He stopped outside the closed gate.

"You will remember me who walked through the flames," he said loudly in the Oripesh tongue. "You will open the gate for your brother as he would visit you."

For a moment nothing happened, and then the gate swung open. Conan Lang entered the village.

The native guard eyed him with suspicion, but he kept his distance. Conan Lang noticed that he had a bow by the log wall. There was nothing like constant warfare for the production of new weapons, he reflected. Civilization was bringing its blessings to the Oripesh with leaps and bounds.

Conan Lang walked through the village unmolested, taking rapid mental notes. He saw storehouses for ricefruit and observed slaves being marched off to work in the fields. The houses in the village were strong and comfortable, but there was a tense air in the village, a feeling of strain. Conan Lang approached a native and stopped him.

"Brother," he said, "I would see your chiefs. Where are they?"

The native looked at him warily. "The Oripesh have no chiefs," he said. "Our king is in council."

Conan Lang nodded, a sick feeling inside him. "It is well," he said. "Ren

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—I would see him."

The native jerked his thumb contemptuously toward the back of the village. "He is there," he said. "Outside."

Conan Lang moved through the village, watching, missing nothing. He went all the way through and came out through the back wall. There, the old-style native huts baked in squalor under the blazing sun. There was no log wall around them, although they were inside the moat system. A pig rooted around for garbage between the huts.

"Slums," Conan Lang said to himself.

He walked among the huts, ignoring the fearful, suspicious eyes of the natives. He found Ren preparing to go out into the fields. The chief's son was thin. He looked tired and his eyes were dull. He saw Conan and said nothing.

"Hello, Ren," said Conan Lang.

The native just looked at him.

Conan Lang tried to think of something to say. He knew what had happened—the chiefs and their sons had been so busy with ritual work for the tribe that they had lagged behind in the cultivation of the new ricefruit. They had stuck to the old ways too long and their people had passed them by.

"I can help you, my brother," Conan Lang said softly. "It is not too late."

Ren said nothing.

"I will help you with a field of your own," said Conan Lang. "Will you let me help you?"

The native looked at him and there was naked hate in his eyes. "You said you were my friend," he said. Without another word, he turned and left. He did not look back.

Conan Lang wiped the sweat from his forehead and went on with his work. The sensitive part of his mind retreated back in to a dark, insulated corner and he let his training take over. He moved along, asking questions, watching, taking mental notes.

A little thing, he thought.

A new kind of plant.

A week later, Conan Lang had completed his check. He sat by the evening cook fire with Julio, smoking his pipe, watching the shadows in the field.

"Well, we did a good job," he said. "It's awful."

"It would have come without us," Julio reminded him. "It does no good to brood about it. It is tough, sometimes, but it is a small price to pay for survival."

"Yes," said Conan Lang. "Sure."

"Your results check out with mine?"

"Mostly. It's the same old story, Julio."

Conan Lang puffed slowly on his pipe, reconstructing what had happened. The new ricefruit had made it valuable for a family to hang on to one piece of land that could be used over and over again. But only a lim-

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ited amount of the land could be used, because of natural factors like the presence or absence of available water. The families that had not taken the plunge right away were virtually excluded, and the society was divided into the landed and the landless. The landless gradually had to move further and further from the main village to find land upon which to grow the older type of ricefruit—sometimes their fields were so far away that they could not make the round trip in a single day. And they could not get too far away and start over, because of the tribal warfare that had broken out between villages now that valuable stores of ricefruit were there for the taking. The old joint family co-operation broke down, and slaves became economically feasible.

Now that the village need not be periodically moved, it too became valuable and so was strongly fortified for defense. One old chief, grown powerful with fields of the staple ricefruit, set himself up as a king and the other chiefs went to work in his fields.

Of course, Sirius Ten was still in transition. While the old patterns were being destroyed, new ones, less obvious to the untrained eye, were taking their place. Disintegration and reintegration marched hand in hand, but it would be tough on the natives for a while. Process Corps techniques had speeded up the action almost beyond belief, but from here on in the Oripesh were on their own. They would go on and on in their individual development—although no two peoples ever went through exactly the same stages at the same time, it was possible to predict a general planet-wide trend. The Oripesh would one day learn to write, since they already had a crude pictographic system for ritual use. When the contact finally came from the hostile stars in the future, what histories would they have written? Who would they remember, what would they forget? Would there be any twisted legend or myth left that recalled the long-ago time when the gods had come out of the mountains to change the lives of their people?

That was the way to look at it. Conan Lang tapped out his pipe on a rock. Just look at it like a problem, a textbook example. Forget about the people, the individuals you could not help, the lives you had made and the lives you had destroyed. Turn off that part of your mind and think in terms of the long-range good.

Or try to.

"We're all through here, Julio," Conan Lang said. "We can head for home now."

"Yes," said Julio Medina. "It has been a long time."

The two men sat silently in the darkness, each thinking his own thoughts, watching the yellow moon sail through silver stars.

After the patrol ship had been signaled, there was nothing to do but

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wait until their pickup could be coordinated with the time schedules of the other Corps men and the operational schedule of the star cruiser. Conan Lang busied himself with his reports while Julio sprawled in the shade and devised intricate and impossible card games with a battered deck that was old enough to be in itself of anthropological interest.

Conan Lang was playing a game, too. He played it with his mind and he was a somewhat unwilling participant. His mind had played the game before and he was tired of it, but there was nothing he could do about it. There wasn't any button that would turn his mind off, and while it was on it played games.

It was engaged in putting two and two together.

This was not in itself uncommon, although it was not as widespread as some people fondly imagined it to be. But Conan Lang played the game where others did not see even one, much less a set of twos with a relationship between them. There is nothing so hard to see as what is termed obvious after the fact. Conan Lang's mind had played with the obvious all his life; it would not let well enough alone. He didn't like it, there were times when he would have preferred to junk it all and go fishing without a thought in his head, but he was stuck with it. When his mind wanted to play the game, it played and that was that.

While he waited for the patrol ship, his mind was playing with a set of factors. There was the history of Earth, taken as a vast overall sequence. There were thinking machines, atomic power, and the field techniques of the Process Corps. There was the fact that Earth had no record of ever having been contacted by another world—they had always done the contacting themselves. There was the new principle that Admiral White had spoken to him about, the integration-acceleration factor for correlating data. There was the incredible, explosive energy of man that had hurled him light-years into space. There was his defiant heart that could tackle the prodigious job of reshaping a galaxy when the chips were down.

Conan Lang put two and two together, and he did not get four. He got five.

He didn't know the answers yet, but he knew enough to formulate the right questions. From past experience, he knew that that was the toughest part of the game. Incorrect answers were usually the products of off-center questions. Once you had the right question, the rest was a matter of time.

The patrol ship came for them finally, and Conan Lang and Julio Medina walked across the soil of Sirius Ten for the last time. They crossed the field where the green plants grew, and neither tried to say what was in his heart. Three had come and

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only two could leave. Andy Irvin had lived and worked and dreamed only to fall on an alien planet light-years away from Earth that could have been his. He was part of the price that was exacted for survival—and he was also a kid with stars in his eyes who had gotten a rotten, senseless break.

After the patrol ship had gone, the green leaves of the ricefruit plants stretched hungrily up toward the flaming sun. The clean water chuckled along the irrigation trenches, feeding the roots in the field. Softly, as though sad with all the memories it carried, the lonesome breeze whispered through the empty hut that had housed the men from Earth.

VI.

Through the trackless depths of interstellar space the star cruiser rode on the power from her atomics. The hum that filled the ship was a good sound, and she seemed to quiver with pride and impatience. It did make a difference which way you were going in space, and the ship was going home.

Conan Lang paced through the long white corridors and walked around the afterhold where the brown sacks of ricefruit had been. He read in the library and joked with the medics who had salvaged his burned body. And always ahead of him, swimming in the great emptiness of space, were the faces of Kit and of his son, waiting for him, calling him home again.

Rob must have grown a lot, he thought. Soon, he wouldn't be a boy any longer—he would be a man, taking his place in the world. Conan remembered his son's voice from a thousand quiet talks in the cool air of evening, his quick, eager eyes—

Like Andy's.

"Dad, when I grow up can I be like you? Can I be an Agent and ride on the ships to other worlds and have a uniform and everything?"

What could you tell your son now that you had lived so long and were supposed to know so much? That life in the Process Corps filled a man with things that were perhaps better unknown? That the star trails were cold and lonely? That there were easier, more comfortable lives? All that was true; all the men who rode the ships knew it. But they knew, too, that for them this was the only life worth living.

The time passed slowly. Conan Lang was impatient to see his family again, anxious to get home. But his mind gave him no rest. There were things he had to know, things he *would* know before he went home to stay.

Conan Lang had the right questions now. He had the right questions, and he knew where the answers were hidden.

Fritz Gottleib.

The star cruiser had hardly touched Earth again at Space One before Conan Lang was outside on the dural-

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loy tarmac. Since the movements of the star ships were at all times top secret matters, there was no one at the port to greet him and for once Conan was glad to have a few extra hours to himself. Admiral White wouldn't expect him to check in until tomorrow anyway, and before he saw Kit he wanted to get things straight once and for all.

The friendly sun of Earth warmed him gently as he hurried across the tarmac and the air felt cool and fresh. He helped himself to an official bullet, rose into the blue sky, and jetted eastward over the city. His brain was seething and he felt cold sweat in the palms of his hands. What was it that Gottleib had said to him on that long-ago day?

"*Sometimes it is best not to know the answers to one's questions, Dr. Lang.*"

Well, he was going to know the answers anyhow. All of them. He landed the bullet in the space adjoining the cybernetics building and hurried inside, flashing his identification as he went. He stopped at a switchboard and showed his priority credentials.

"Call the Nest, please," he told the operator. "Tell Dr. Gottleib that Conan Lang is down here and would like to see him."

The operator nodded and spoke into the intercom. There was a moment's delay, and then he took his earphones off and smiled at Conan Lang.

"Go right on up, Dr. Lang," the operator said. "Dr. Gottleib is expecting you."

Conan Lang controlled his astonishment and went up the lift and down the long white corridors. *Expecting* him? But that was impossible. No one even knew the star cruiser was coming back, much less that he was coming here to the Nest. Impossible—

All around him in the great building he felt the gigantic mechanical brain with its millions of circuits and flashing tubes. The brain crowded him, pressed him down until he felt tiny and insignificant. It hummed and buzzed through the great shielded walls.

Laughing at him.

Conan Lang pushed past the attendants and security men and opened the door of the Nest. He moved into the small, dark room and paused to allow his eyes to become accustomed to the dim light. The room was silent. Gradually, the shadow behind the desk took form and he found himself looking into the arctic eyes of Fritz Gottleib.

"Dr. Lang," he hissed softly. "Welcome to the Buzzard's Nest."

The man had not changed; he was timeless, eternal. He was still dressed in black and it might have been minutes ago instead of years when Conan Lang had last seen him. His black eyebrows slashed across his white face and his long-fingered hands were bent

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slightly like claws upon his desk.

"How did you know I was coming here?" Now that he was face to face with Gottleib, Conan Lang felt suddenly uncertain, unsure of himself.

"I know many things, Dr. Lang," Fritz Gottleib said sibilantly. "Had I cared to, I could have told you ten years ago the exact date, within a day or so, upon which we would have this meeting. I could even have told you what you would say when you came through the door, and what you are going to say five minutes from now."

Conan Lang just stared at him, feeling like an absurd little child who had presumed to wrestle a gorilla. His mind recoiled from the strange man before him and he knew at last that he knew nothing.

"I do not waste words, Dr. Lang," Gottleib said, his eyes cold and unmoving in his head. "You will remember that when we last met you said you wanted to ask some questions of the machine. Do you remember what I said, Dr. Lang?"

Conan Lang thought back across the years. "*Perhaps one day, Dr. Lang,*" Gottleib had said. "*When you are old like me.*"

"Yes," said Conan Lang. "Yes, I remember."

"You were not ready then," Dr. Gottleib said, his white face ghostly in the dim light. "You could not even have framed the right questions, at least not all of them."

Conan Lang was silent. How much *did* Gottleib know? Was there anything he *didn't* know?

"You are old enough now," said Fritz Gottleib.

He turned a switch and the surface of his desk glowed with dull red light. His face, reflected in the flamelike glow, was unearthly. His cold eyes looked out of hell. He rose to his feet, seeming to loom larger than life, filling the room. Moving without a sound, he left the room and the door clicked shut behind him.

Conan Lang was alone in the red room. His heart hammered in his throat and his lips were dry. He clenched his fists and swallowed hard. Alone—

Alone with the great machine.

Conan Lang steadied himself. Purposefully, he made himself go through the prosaic, regular motions of lighting up his pipe. The tobacco was healthily full-bodied and fragrant and it helped to relax him. He smoked slowly, taking his time.

The red glow from the desk filled the room with the color of unreality. Crimson shadows seemed to crouch in the corners with an impossible life of their own. But was anything impossible, here? Conan Lang felt the pulse of the great machine around him and wondered.

Trying to shake off a persistent feeling of dreamlike unreality, Conan Lang moved around and sat down behind Gottleib's desk. The red panel

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was a maze of switches which were used to integrate it with technical panels in other sections of the building. In the center of the panel was a keyboard on an open circuit to the machine and set into the desk was a clear square like a very fine telescreen. Conan Lang noticed that there was nothing on Gottleib's desk that was not directly connected with the machine—no curios, no pictures, no paperweights, not a single one of the many odds and ends most men picked up for their desks during a long lifetime. The whole room was frightening in its very impersonality, as though every human emotion had been beaten out of it long ago and the room had been insulated against its return.

The machines never slept and the circuits were open. Conan Lang had only to ask and any question that could be answered would be answered. The red glow in the room reminded him of the fire and he shuddered a little in spite of himself. Had that really been over three years ago? How much had he learned in those three years when he had seen the Oripesh change before his eyes and had had time for once to really think his life through? How much did he still have to learn?

Conan Lang took a long pull on his pipe and set the desk panel for manual type questioning and visual screen reception. He hesitated a moment, almost afraid of the machine at his disposal. He didn't *want* to know, he suddenly realized. It wasn't like that. It was rather that he *had* to know.

Framing his words carefully, Conan Lang typed out the question that had been haunting him for years:

IS THE EARTH ITSELF THE SUBJECT OF PROCESS MANIPULATION?

He waited nervously, sure of the answer, but fearful of it nevertheless. There was a faint, all but inaudible hum from the machine and Conan Lang could almost feel the circuits closing in the great walls around him. The air was filled with tension. There was a brief click and one word etched itself blackly on the clear screen:

YES.

Conan Lang leaned forward, sure of himself now, and typed out another question.

HOW LONG HAS THE EARTH BEEN MANIPULATED AND HAS THIS CONTROL BEEN FOR GOOD OR EVIL?

The machine hummed and answered at once.

THE EARTH HAS BEEN GUIDED SINCE EARTH YEAR NINETEEN HUNDRED A.D. THE SECOND PART OF YOUR QUESTION IS MEANINGLESS.

Conan Lang hesitated, staggered in spite of himself by the information he was getting. Then he typed rapidly:

WITH REFERENCE TO GOOD, EQUATE SURVIVAL OF THE HUMAN RACE

The screen clouded, cleared, and

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the words formed.

THE CONTROL HAS BEEN FOR GOOD.

Conan Lang's breathing was shallow now. He typed tensely:

HAS THIS CONTROL COME FROM WITHIN THIS GALAXY? IF SO, WHERE? IS THERE USUALLY AN AGENT OTHER THAN EARTH'S IN CHARGE OF THIS MACHINE?

The hum of the machine filled the blood-red room and the screen framed the answers.

THE CONTROL HAS COME FROM WITHIN THE GALAXY. THE SOURCE IS A WORLD KNOWN AS RERMA, CIRCLING A STAR ON THE EDGE OF THE GALAXY WHICH IS UNKNOWN TO EARTH. THE MAN KNOWN AS GOTTLEIB IS A RERMAN AGENT.

Conan Lang's pipe had been forgotten and gone out. He put it down and licked his dry lips. So far so good. But the one prime, all-important question had not yet been asked. He asked it.

IF THE PLAN IS FOLLOWED, WHAT WILL BE THE FINAL OUTCOME WITH RESPECT TO RERMA AND THE EARTH?

The machine hummed again in the red glow and the answer came swiftly, with a glorious, mute tragedy untold between its naked lines:

RERMA WILL BE DESTROYED. THE EARTH WILL SURVIVE IF THE PLAN IS CAREFULLY FOLLOWED.

Conan Lang felt tears in his eyes and he was unashamed. With time forgotten now, he leaned forward, asking questions, reading replies, as the terrible, wonderful story unfolded.

Far out on the edge of the galaxy, the ancient planet of Rerma circled her yellow sun. Life had evolved early on Rerma—had evolved early and developed fast. While the other humanoid peoples of the galaxy were living in caves, the Rerma were building a great civilization. When Earth forged its first metal sword, the Rerma split the atom.

Rerma was a world of science—true science. Science had eliminated war and turned the planet into a paradise. Literature and the arts flourished hand in hand with scientific progress, and scientists worked surrounded by cool gardens in which graceful fountains splashed and chuckled in the sun. Every man was free to develop himself as an individual and no man bent his head to any other man.

The Rerma were the human race in full flower.

But the Rerma were few, and they were not a warlike people. It was not that they would not fight in an emergency, but simply that they could not possibly win an extended encounter. Their minds didn't work that way. The Rerma had evolved to a point where they were too specialized, too

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well adjusted to their environment.

And their environment changed.

It was only a question of time until the Rerma asked the right questions of their thinking machines and came up with the knowledge that their world, situated on the edge of the galaxy, was directly in the path of a coming cultural collision between two star systems. The Rerma fed in the data over and over again, and each time the great machines came up with the same answer.

Rerma would be destroyed.

It was too late for the equation to be changed with respect to Rerma—she had gone too far and was unfortunately located. But for the rest of the human race, scattered on the far-flung worlds that marched along the star trails, there was a chance. There was time for the equation to be changed for them—if only someone could be found to change it! For the Rerma had the knowledge, but they had neither the manpower nor the driving, defiant spirit to do the job themselves. They were capable of making heroic decisions and sticking by them, but the task of remolding a star system was not for them. That was a job for a young race, a proud and unconquerable race. That was a job for the men of Earth.

The ships of the Rerma found Earth in the earth year 1900. They knew that in order for their plan to succeed the Rerma must stand and fight on that distant day when galaxies collided, for their power was not negligible despite their lack of know-how for a long-range combat. They must stand and fight and be destroyed—the plan, the equation, was that finely balanced. Earth was the only other planet they found that was sufficiently advanced to work with, and it was imperative that Earth should not know that she was being manipulated. She must not suspect that her plans were not her own, for a young race with its pride wounded is a dubious ally and an ineffective fighting mechanism.

The Rerma set to work—willing even to die for a future they had already lived. The scientists of Rerma came secretly to Earth, and behind them, light-years away, their crystal fountains still sparkled sadly in the sun.

Rerma would be destroyed—but humanity would not die.

Conan Lang sat alone in the red room, talking to a machine. It was all clear enough, even obvious, once you knew the facts. Either there were no advanced races in the galaxy, which would account for Earth having no record of any contact—or else the Earth *had* been contacted secretly, been manipulated by the very techniques that she herself was later to use on undeveloped worlds.

He looked back on history. Such profound and important changes as the Neolithic food revolution and the steam engine had been produced by

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Earth alone, making her the most advanced planet in the galaxy except for the Rerma. Earth had a tradition of technological skill behind her, and she was young and pliable. The Rerma came—and the so-called world wars had followed. Why? Not to avenge the honor of insulted royalty, not because of fanatics, not because of conflicting creeds—but in a very real sense to save the world. The world wars had been fought to produce atomic power.

After 1900, the development of Earth had snowballed in a fantastic manner. The atom was liberated and man flashed upward to other planets of the solar system. Just as Conan Lang himself had worked through the ancestor gods of the Oripesh to bring about sweeping changes on Sirius Ten, the Rerma had worked through one of the gods of the Earthmen—the machine.

Cybernetics.

Man swept out to the stars, and the great thinking machines inevitably confronted them with the menace from beyond that drew nearer with each passing year. Young and proud, the men of Earth accepted the most astounding challenge ever hurled—they set out to reshape a galaxy to give their children and their children's children a chance for life.

And always, behind the scenes, beneath the headlines, were the ancient Rerma. They subtly directed and hinted and helped. With a selflessness unmatched in the universe, these representatives of a human race that had matured too far prepared Earth for galactic leadership—and themselves for death on the edge of the galaxy. They had unified Earth and pushed and prodded her along the road to survival.

When the Rerma could have fled and purchased extra time for themselves, they chose instead—these peace-loving people—to fight for another chance for man.

Conan Lang looked up, startled, to find the black figure of Fritz Gottleib standing by his side. He looked old, very old, in the blood-red light and Conan Lang looked at him with new understanding. Gottleib's impatience with others and the vast, empty loneliness in those strange eyes—all that was meaningful now. What a life that man had led on Earth, Conan Lang thought with wonder. Alone, wanting friendship and understanding—and having always to discourage close personal contacts, having always to fight his lonely battle alone in a sterile little room, knowing that the very men he had dedicated his life to help laughed behind his back and compared him to a bird of prey.

"I've been a fool, sir," Conan Lang said, getting to his feet. "We've all been fools."

Fritz Gottleib sat down again behind his desk and turned the machine off. The red glow vanished and they

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were left in the semidarkness.

"Not fools, Dr. Lang," he said. "It was necessary for you to feel as you did. The feelings of one old man—what are they worth in this game we are playing? We must set our sights high, Dr. Lang."

Conan Lang waited in the shadows, thinking, watching the man who sat across from him as though seeing him for the first time. His mind was still groping, trying to assimilate all he had learned. It was a lot to swallow in a few short hours, even when you were prepared for it beforehand by guesswork and conjecture. There were still questions, of course, many questions. He knew that he still had much to learn.

"Why me?" Conan Lang asked finally. "Why have I been told all this? Am I the only one who knows?"

Fritz Gottleib shook his head, his face ghost-white in the darkened room. "There are others who know," he said sibilantly. "Your superior officer, Nelson White, has known for years of course. You were told because you have been selected to take over his command when he retires. If you are willing, you will work very closely with him here on Earth for the next five years, and then you will be in charge."

"Will I . . . leave Earth again?"

"Not for a long time, Dr. Lang. The integration-acceleration principle will keep you busy—we are in effect lifting Earth another stage and the results will be far-reaching. But you will be home, Dr. Lang—home with your family and your people.

"That is all, Dr. Lang," Gottleib hissed.

Conan Lang hesitated. "I'll do my level best," he said finally. "Good-by, sir . . . I'll see you again."

Conan Lang put out his hand to the man he had called the Buzzard and Gottleib shook it with a firm, powerful grip.

"Good-by, Conan," Fritz Gottleib said softly.

Conan Lang turned and walked from the dark room, leaving the man from Rerma sitting alone in the shadows of the Nest.

The little bullet rose vertically on her copter blades through the evening sky, hovered a moment in the cool air under the frosty stars, and then flashed off on her jets into the west. Conan Lang set the controls and leaned back in the seat, at peace with himself at last. There *was* meaning to it all, there was a purpose—and Andy and all the others like him on the far trails had not sacrificed their lives for nothing.

Conan Lang breathed the clean air of Earth and smiled happily. Ahead of him, waiting for him, were Kit and Rob and he would never have to leave them again. He opened the lateral ports and let the wind hurl itself at his face.

THE END

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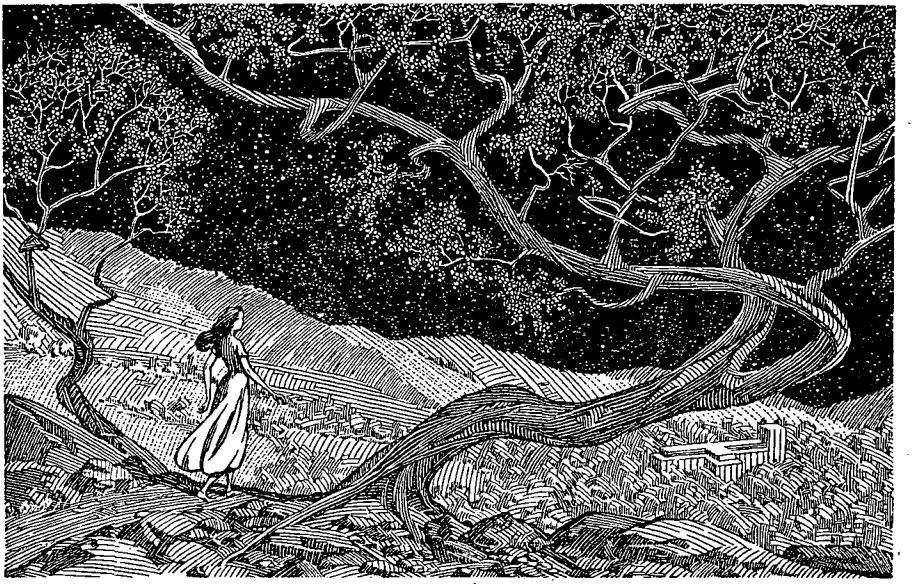

FAST FALLS THE EVENTIDE

BY ERIC FRANK RUSSELL

In the long, *long megayears of the future, even suns and planets grow old and eventually die. And with them, the race they nurtured—unless a different way of life can be found!*

Illustrated by van Dongen

It was an old world, incredibly old, with a pitted moon and a dying sun and a sky too thin to hold a summer cloud. There were trees upon it but not the trees of yore, for these were the result of aeons of gradual accommodation. They inhaled and exhaled far less than did their distant forebears and they sucked more persistently at the aged soil.

So did the herbs.

And the flowers.

But the petal-lacking, rootless children of this sphere, the ones able to move around of their own volition, these could not compensate by sitting in one place and drawing from the ground. So slowly, ever so slowly they had dispensed with what once had

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been a basic need. They could manage quite well on the bare minimum of oxygen. Or at a pinch without any at all, experiencing no more than mild discomfort, a certain lassitude. All could do this without exception.

The children of this world were bugs.

And birds.

And bipeds.

Moth, magpie and man, all were related. All had the same mother: an ancient sphere rolling around a weakly glowing orange ball that some day would flicker and go out. Their preparation for this end had been long and arduous, partly involuntary, partly deliberate. This was their time: the age of fulfillment, shared between all, belonging to all.

Thus it was in no way odd that Melisande should talk to a small beetle. It sat attentively on the back of her pale, long-fingered hand, a tiny creature, black with crimson spots, clean and shiny as if subjected to hours of patient polishing. A ladybird. An amusingly toylike entity that seemed to lack a miniature handle in its side with which to wind it up.

Of course the ladybird could not understand a word of what was being said. It was not *that* intelligent. Time had run so far and the atmosphere become so thin that the insect's wings had adapted accordingly and now were twice the size of those owned by ladybirds of long ago. And with the physical alteration there had been mental alteration; its pin-sized brain was different too. By the standard of its own humble kind it had climbed several rungs up the ladder of life. Though it could not determine meanings, it knew when it was being addressed, sought human company, derived comfort from the sound of a human voice.

And so with the others.

The birds.

The latter-day bees.

All the timid things that once had run for a hiding place or sought shelter in the dark.

Those who had survived—and many species had not—were shy no more. Regardless of whether or not they could understand the mouth-noises made, they liked to be spoken to, their existence acknowledged. They could and did listen for hours, extracting strange pleasure from the intimacy of sound. Or was the pleasure strange?

Perhaps not, for there were times when the sonic relationship was reversed and men stood fascinated while, in lilting language peculiarly its own, a blackbird or nightingale poured forth its very soul.

It was the same indefinable ecstasy.

You see?

So Melisande talked as she walked and Little Redspots listened with his own insectual pleasure until finally she gently flipped her hand and laughed, "Ladybird, ladybird, fly away home."

It raised colorful wing-cases, spread gauzy wings and fluttered from sight. Melisande paused to look at the stars.

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In these times they could be seen with brilliance and clarity by day as well as by night, a phenomenon that would have made her air-loving ancestors become filled with fear lest the breath of life soon depart.

No such sensation was within her as she studied the stars. There was only curiosity and speculation coming from a purely personal source. To her, the five-miles-high atmosphere, the dim sun, the sparkling stars were all normal. Often she looked at the stars, sorting them out, identifying them, asking herself the same question again and again.

"Which one?"

And the heavens answered only, "Ah, which?"

Ceasing her speculation she tripped lightly onward along the narrow woodland path that led into the valley. Far to her left, on the verge of the horizon, something long, slender and metallic arrowed down from the sky and vanished beyond the curve of the earth. A little later a much muted thundering came to her ears.

Neither the sight nor the sound captured her attention. They were too ordinary. The ships of space came often to this ancient world, sometimes once in a month, sometimes twice in a day. Rarely were any two alike. Rarely did the people of one vessel resemble the crew of another.

They had no common language, these visitors from the glittering dark. They spoke a multitude of tongues. Some could talk only mentally, in powerfully projected thought-forms. Some were nonvocal and nontelepathic, could not speak at all, and communicated by means of dexterous finger-motions, ultra-rapid vibration of cilia or other gesticulatory devices.

Once, not so long ago, she had been briefly entertained by the slate-colored, armor-skinned personnel of a ship from Khva, a world unthinkable distances beyond Andromeda. They had been completely blind and totally dumb, making superfast limb-signals at each other and registering them through sensitive esp-organs. They had talked to her without voice and admired her without eyes.

All this was what made learning so hard. At seven hundred years of age she had just finished her final examinations and gained the status of an adult. Long, long ago one might have absorbed the wisdom of an era in a mere century. In the dimmer days still farther back one might have done it in ten years. But not today. Not today.

Now in these solemn times of the final centuries the knowledge to be imbibed was in quantity far too great for swift assimilation. It was an immense pile of data created by the impact of a mighty cosmos composed of worlds without end. Each new ship added a few modest grains to the mass, and the mountain already so built was as nothing to the titanic quantities

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yet to come—if this world lived long enough to receive them.

If!

There was the rub. Creation was conquered and made the slave of the shapes it had brought forth. The atom and the power within the atom were tools in the hands or pseudo-hands of matter forms able to think and move. Macrocosm and microcosm were equally the playthings of those whose ships roamed endlessly through the tremendous void.

But there were none who knew how to revive an expiring sun.

It could not be done in theory, much less in fact.

It was impossible.

So here and there, at great intervals, a senile sun would flare up a while, collapse into itself, flare again like a feeble thing making its last frantic snatch at life and then become extinguished for all time. A tiny spark in the dark suddenly blown out, unnoticed and unmissed from the limitless host that still blazed on.

Almost each vanishing marked tragedy, perhaps immediate in one case and delayed in another. Some life forms could resist cold longer than others but eventually succumbed just the same. By their superior techniques some could warm themselves and their worlds until the raw material sources of their heat were exhausted. Then they, too, became as if they had never been.

Any system whose primary reverted to an enormous cinder thereby became the property of a great, white, greedy idiot bearing the name of Supernal Frost. He would share his drear estates with none but the dead.

Melisande thought of all these things as she reached the valley. But the thoughts were not morbid; they held nothing of sadness or resentment. She was of her own kind and it was a life form old in experience and remarkably astute. It had faced the inevitable a thousand times before and had learned the futility of battering against it head-on. It knew what to do with an immovable object: one climbs over it or burrows under it or sneaks around it. One uses one's brains because they are there to be used.

Inevitability was not to be feared.

That which cannot be stayed must be avoided with skill and ingenuity.

A great marble palace sprawled across the end of the valley. Its farther side faced a long series of shrub-dotted and flower-carpeted terraces with narrow lawns and feathery fountains. Its nearer side was the back looking upon nothing but the valley. Melisande always approached it from the rear because the path through the woods was the short cut to home.

Mounting the steps she experienced a thrill of excitement as she entered the huge edifice. Wide, mosaic-floored corridors with walls bearing colorful murals led her to the east wing whence came a steady murmur of voices and

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occasionally the penetrating sound of a caller-trumpet.

Bright-eyed with anticipation, she went into a large hall whose seats rose in semicircular tiers to considerable height. It was a place originally designed to hold four thousand. The number of people now seated therein came to no more than two hundred—almost a score of empty seats for every one occupied. The place looked bare. The voices of the few floated hollowly around the emptiness, were echoed by the curved walls and reflected by the overhead cupola.

All the world was like this: facilities for thousands available to mere dozens. Cities with small-town populations; towns numbering no more citizens than a one-time village; and villages holding only three or four families. Whole streets of houses of which half a dozen were homes while the others, empty, silent and glassy-eyed, stared at the lowering sky.

There were just over one million people on this world. Once upon a time they had numbered four thousand millions. The vanished numbers had long since taken to the star-trails, not like rats leaving a sinking ship but boldly, confidently as those whose destiny has become magnified until too great for the confines of one planet.

The small remainder were to follow as soon as they were ready. And that was why the two hundred were here, waiting in the hall, fidgety, chattering, a little on edge as they listened for the fateful blare of the caller-trumpet.

"Eight-two-eight Hubert," it suddenly gave forth. "Room Six."

A blond giant came up from his seat, stalked down the aisle watched by almost two hundred pairs of eyes. Voices were temporarily silent. He went past Melisande who smiled and murmured low.

"Good luck!"

"Thanks!"

Then he was gone through the distant door. The chatterers resumed. Melisande sat herself at the end of a row next to a thin, swarthy youth of some seven and a half centuries, little older than herself.

"I'm a minute late," she whispered. "Have they been calling long?"

"No," he assured. "That last name was the fourth." He stretched out his legs, pulled them in, stretched them out again, surveyed his fingernails, shifted in his seat, registered vague discomfort. "I wish they'd hurry up with this. The strain is rather—"

"Nine-nine-one Jose-Pietro," boomed the trumpet. "Room Twenty."

He heard it with his mouth open, his eyes startled. The way he came to his feet was slow, uncertain. He licked thin lips suddenly gone dry, cast an appealing glance at Melisande.

"That's me!"

"They must have heard you," she laughed. "Well, don't you want to go?"

"Yes, of course." He edged past her, his gaze on the door through

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which the blond Hubert had gone. "But when it comes to the point I sort of go weak in the knees."

She made a negligent gesture. "Nobody's going to amputate your legs. They're simply waiting to give you a document—and maybe it'll be one with a gold seal."

Throwing her a look of silent gratitude, he speeded up, exited with a mite more self-assurance.

"Seven-seven Jocelyn—Room Twelve."

And immediately after, "Two-four-oh Betsibelle—Room Nineteen."

Two girls went out, one dark and plump and smiling, one tall, slender, red-haired and serious.

Came a series of names in quick succession: Lurton, Irene, George, Teresa-Maria, Robert and Elena. Then, after a short interval, the summons for which she was waiting.

"Four-four Melisande—Room Two!"

The man in Room Two had light gray eyes, snowy hair and smooth, unlined features. He might have been middle-aged—or old, extremely old. There was no way of telling at a time when a person can retain a seamless face and snowy locks for more than a thousand years.

Waiting for her to be seated, he said: "Well, Melisande, I am happy to say you have passed."

"Thank you, my tutor."

"I felt sure you would pass. I viewed it as almost a foregone conclusion." He smiled across at her, went on, "And now you want to know where you are weak, where you are strong. Those are the essential details, aren't they?"

"Yes, my tutor." She uttered it in low tones, her hands folded demurely in her lap.

"In general knowledge you are excellent," he informed. "That is something of which to be proud—that one should hold the immense storehouse of wisdom described by the inadequate name of general knowledge. You are also most satisfactory in sociology, mass-psychology, ancient and modern philosophies and transcosmic ethics." He leaned forward, looking at her. "But you are rather poor in general communications."

"I am sorry, my tutor." She bit her lower lip, vexed with herself.

"You are nontelepathic and seem quite unable to develop even rudimentary receptivity. When it comes to visual signaling you are somewhat better but still not good enough. Your communication-rate is sluggish, your mistakes numerous, and you appear to be handicapped by a form of tactile uncertainty."

She was now looking at the floor, her face wearing a blush of shame. "I regret it, my tutor."

"There is nothing to regret," he contradicted sharply. "One cannot excel in everything, much as one might like to do so." He waited for her eyes

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to come up, then proceeded, "As for purely vocal forms of communication, you are no more than fair in the guttural languages." A pause, then: "But you are superb in the liquid ones."

"Ah!" Her features brightened.

"Your oral and written tests for liquid languages were taken in the speech-patterns of the Valreans of Sirius. Your errors were exactly none. Your vocal rate was three hundred twenty words per minute. The average for the Valreans is three hundred fourteen. That means you can speak their language a little better than they can themselves." He smiled to himself, deriving much satisfaction from the thought that his pupil could outshine the very originators of a linguistic mode. "So now, Melisande, the time has come to make serious decisions."

"I am ready, my tutor." Her gaze forward was steady, level and unswerving.

"First I must give you this." He handed her a thin scroll from which dangled a crimson cord terminating in a gold seal. "I congratulate you."

"Thank you!" Her fingers took it, held it, fondled it like something infinitely precious.

"Melisande," he asked, gently, "do you desire children?"

Her answer came evenly, undisturbed, quite without trace of embarrassment. "Not yet, my tutor."

"Then you consider yourself free to go out?" He gestured toward the window beyond which a multimillion lights gleamed and beckoned.

"Yes."

His face became solemn. "But you will not abandon all thoughts of children of your own? You will not plunge so deeply and become so absorbed as to be forgetful of your own shape and kind?"

"I think not," she promised.

"I am glad of that, Melisande. We are scattered afar, in little groups and numbers over an immensity of places. There is no need to increase our count within the cosmos, no need at all. But we should not reduce that count. We should maintain it. That way lies immortality as a species."

"Yes, I know. I have thought of it often." She studied her scroll without really seeing it. "I shall play my little part when the right moment comes."

"You have plenty of time, anyway. You are very young." He sighed as if he wished he could say the same of himself. Crossing the room to where a machine stood by the wall, he opened a cabinet at its side, took out a thick wad of cards. "We'll sort the applications and narrow them down to those most suitable."

He fed the cards one by one into the machine. They were no more than rectangles of thin, white plastic each bearing a reference number at the head, the rest being perforated with many circular or square-shaped holes. When the lot had been inserted he opened a cover revealing a small keyboard. On this he typed, "Nonvocals,"

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and pulled a lever at one side.

The machine clicked, whirred, expelled cards in rapid succession. When it had finished, he glanced at its retention-counter.

"Eighty-four left."

Again resorting to the keyboard, he picked out the word, "Gutturals." The machine responded by throwing out another spray of cards. "Supersonics." More cards. "Staccatos." Out shot a little bunch. "Whistlers." No result.

"Twenty-one." He glanced at his pupil. "They are all liquid speakers now but I think it would be as well if we eliminated the slow ones, don't you?" Getting her nod, he reset the keyboard, "300-max." Several cards emerged. Extracting the remainder, he shuffled them in sensitive fingers, eyed the stars through the window. "There are eleven, Melisande. You have eleven worlds from which to choose."

Filing the first card into a different part of the machine, he set a pair of dials and pressed a stud. The apparatus emitted a faint hum while it warmed up, then a voice came from its hidden speaker.

It said: "Application Number 109,747. Valrea, a union of four planets located in—"

Abruptly it cut off as he jabbed another stud in response to a wave of Melisande's hand.

"You are not interested?"

"No, my tutor. Perhaps I ought to be because I already know their language and that would save a lot of bother. But they have some of us already, haven't they?"

"Yes. They applied for four hundred. We sent them thirty-six and, much later on, another twenty." He regarded her with almost paternal solicitude. "You would have company there, Melisande. You would have others of your own kind, few as they are."

"That may be," she admitted. "But is it fair that people like the Valreans, who have gained some of what they want, should be given still more while others who have none should continue to be denied?"

"No, it is not." He fed in a second card.

"Application 118,451," said the machine. "Brank, a single planet located in the Horse's Head Nebula; Section A71; Subsection D19. Mass 1.2. Civilization type-F. The dominant life form is a bipedal vertebrate as shown."

A screen above the apparatus glowed in full colors, depicted several gaunt, greenish-skinned creatures with long, spindly arms and legs, seven-fingered hands, hairless skulls and enormous yellow eyes.

For another two minutes the voice poured forth a flood of data concerning Brank and its emaciated inhabitants. Then it ceased and the machine went quiescent.

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"Thirty years ago they asked for a hundred of us," he told Melisande. "We sent ten. They have now been allocated another six of which you may be one if you so desire."

Seeing that she was noncommittal, he slid another card into the apparatus.

"Application 120,776. Nildeen, a planet with one large satellite, heavily populated, located in the Maelstrom, Section L7, Subsection CC3."

It went on and on. The appropriate life form displayed itself on the screen, a tentacular, eyeless type of being with esp-organs protruding from its head like an insect's antenna. The Nildeens already had had forty of Melisande's kind, still wanted more. She turned them down.

The eleventh and last card aroused her greatest interest, caused her to lean forward with ears alert and eyes alight.

"Application 141,048. Zelam, a single planet located on the fringe of the known, reference numbers and coordinates not yet filed. Recent contact. Mass I. Civilization type-J. Dominant life form is reptilian as shown."

They had a faint resemblance to erect alligators, though Melisande did not know it. All of her own planet's lizardlike species had vanished a million years ago. There were now no local forms to which she could liken these horny-skinned, long-jawed and toothy Zelamites. By the standards of the dim past they were appallingly ugly; but by the standards of her especial planet and her especial era they were not ugly. They were merely an individualistic aspect of the same universal thing which is named Intelligence.

True, the varying forms might also vary in the accuracy with which they reflected this elusive but cosmos-wide thing, yet, taking the long view, it was nothing but a variation in time. Some had more centuries to catch up than did others. Some had come early on the scene and that was their good fortune. Others had come late and that was their hard luck. They were like differently handicapped runners in the same field, spread out, panting, some in front, some behind, but all heading the same way, all destined to pass the finishing line. The Zelamites were held-back runners.

"I will go to those," she said, making it an irrevocable decision.

Spreading the eleven cards across his desk, he surveyed them with a bothered frown. "They asked for sixty. Everyone asks for far too many, especially the newcomers. We've none to spare just yet. But we don't like to refuse anyone."

"So?"

"It has been suggested that we send them one, just one, as a beginning. It would show willingness if nothing else."

"I am one," she pointed out.

"Yes, yes, I know." He had the re-

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signed air of a person about to be cornered without hope of escape. "We would rather that one were masculine."

"Why?"

"Dear me!" It defeated him completely. "There is no reason at all except that we would prefer it."

"Surely, my tutor, it would be a retrograde step and quite unworthy of us to insist upon something without any reason?"

"Not if it does no harm," he countered. "There is the true test—whether it does harm or good."

"Does it do the Zelamites good to refuse them a suitable volunteer?"

"We are not refusing them, Melisande. There are others besides yourself. Someone else may also have chosen Zelam. A dozen may wish to go there. At this stage, with so many applications, we just can't send all of them. Only one can go now. Others may follow later."

"Find out for me, please," she begged.

A mite unwillingly he flicked the switch on his desk and spoke into the silver instrument beside it.

"How many have selected Zelam, Reference 141,048?"

There was quite a long wait before the answer came, "None."

Switching off, he leaned back, eyed her thoughtfully. "You will be lonely."

"All first arrivals are lonely."

"There may arise perils beyond imagining."

"Which will remain the same whether borne by one or shared by a hundred," she gave back, undismayed.

Searching around for one last item of discouragement, he told her, "The Zelamites are nocturnal. They will expect you to work at night and sleep by day."

"Those of us on Brank have been doing the same for years, and many more elsewhere. My tutor, should it be harder for me than for them?"

"No, it should not." He came across to her. "I see that you are determined in your choice. If it be your destiny, it is not for me to thwart it." Taking her hand, he raised it gently, impressed a light kiss upon her fingers in the conventional farewell. "Good luck, Melisande. I am glad to have had you as a pupil of mine."

"Thank you, my tutor." Holding her scroll tightly to her breast, she paused in the doorway as she went out, gave him a final bright-eyed smile. "And I am proud to have had you!"

Long after she had gone he sat and gazed absently at the door. They came and they went, one after another. Each arrived as an utter stranger, departed like a child of his very own taking some of his essential essence with them.

And each one that went forever among the vast concourse of stars made his dying world a fraction smaller, barer, less possessed of life. It is not easy to remain with a long-

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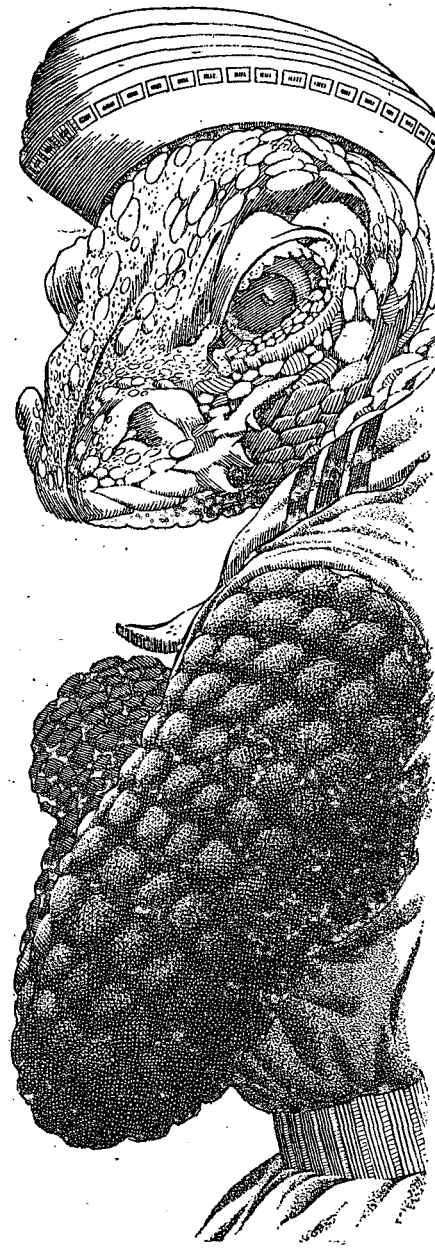
loved sphere which is nearing its end, to watch the flame die down, watch the shadows creep and grow.

Even at the terrific velocities of this age the journey to Zelam was long and tedious, stretching through days and weeks into many months. It involved several changes, first from a huge hyperspatial mainliner to a smaller branchliner, then to a light blue sphere crewed by dumb Xanthians, then to a battered old rocketship manned by a weirdly mixed mob among whom were two bipeds of Melisande's own kind. Finally to a strange, wedge-shaped and mysteriously powered contraption which sinuous and scintillant Haldisians employed for trading around a small group of systems in one of which was the planet called Zelam.

Beyond this point was a great sprawl of darkness in which reposed a coil of brilliant mist that eventually would be reached by bigger and better ships. Another island universe. Another mighty host of living shapes and forms the highest of which would share one thing in common—and therefore prove willing to share it yet again.

But the length of the trip had been useful. With the aid of a phonetic dictionary and a rudimentary phonograph provided by Zelam, plus her own natural aptitude, she had become an accomplished speaker of the language by the time the planet rolled into view.



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Lacking ladder, ramps or anything of that nature, the Haldisians got rid of her by the simple expedient of throwing her through the outer door of the air lock. A power exerted by them personally or perhaps by some unseen apparatus within the vessel—she did not know which—took hold of her, lowered her gently the forty feet to earth. Her luggage followed the same way. So did two of the crew. Another two came out but floated upward, gained the ship's flat topside, commenced opening cargo hatches.

There was a small Zelamite deputation to meet her, the news of her coming having been received a few days before. They were bigger than she had expected for the screen on which she had first seen them had given no indication of relative size. The shortest of them towered head and shoulders above her, had sharp-toothed jaws the length of her arm and looked as if he could cut her in half at one savage snap.

The largest and oldest of the group, a heavily built and warty-faced individual, came forward to meet her as the others hastened to pick up her bags.

"You are the one named Melisande?"

"That's me," she admitted, smiling at him.

He responded with what looked remarkably like a threatening snarl. It did not mislead her in the least. Her kind had learned a thousand centuries ago that those with different facial contours and bony structure perforce must have different ranges of expressions. She knew that the alarming grimace was nothing but an answering smile.

The tone of his voice proved it as he went on, "We are pleased to have you." His orange-colored eyes with their slot-shaped pupils studied her a moment before he added in mild complaint, "We asked for a hundred and hoped to get ten, perhaps twenty."

"More will come in due course."

"It is to be hoped so." He threw a significant glance toward the ship from which items of cargo were floating down: "The Haldisians have twenty. We are tired of hearing them boast about it. We think we are entitled to at least as many."

"They started with two of us," she pointed out. "The others came later—as yours will do. We have no choice but to deal with applications in strict rotation."

"Oh, well—" He spread the long fingers of one hand in the Zelamite equivalent of a shrug, conducted her to a six-wheeled vehicle standing nearby, superintended the loading of her luggage, then got in beside her. "I must compliment you on your fluency. It is remarkable."

"Thank you."

She concentrated on the blue-moss coated and yellow-flowered landscape as he drove to town at a fast pace.

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His body exuded a faintly pungent odor which her nostrils noted but her brain ignored. That was another very ancient lesson: that different metabolisms produce different manifestations. How boring would the universe be if all its creatures were identically the same!

They drew up before a long, low stone-built edifice with high-tilted roofs and plastic windows. The place was imposing mostly because of its lengthy facade. It stretched at least half a mile, had a blue-moss carpet along its front and a railed yard at each end.

"This is your college." He pointed to the nearer end. "And there is your home." Observing her expression he added by way of explanation, "of course, we cannot expect more than one person can do. We built apartments for ten, with space for extensions if we were lucky enough to get more of you."

"I see." Getting out, she watched her bags being taken inside. Despite centuries of training, free choice of destination and months of anticipatory journeying, some adjustment still was necessary. "And there is your home," he had said. It would take her at least a week and perhaps a month to get used to thinking of it as home. Probably even more because domestic routine would be topsy-turvy so long as she slept daytimes and worked nights.

"Before you go in," he suggested, "what about something to eat?"

"Good heavens, no!" She gave a tinkling laugh. "The Haldisians insisted on providing a farewell dinner. They didn't know when to stop. I don't feel like looking at any more food for days."

"*Armph!*" The twist on his reptilian face suggested that he'd have liked it better if the Haldisians had left well alone. "In that case, all I can offer you is the rest and relaxation you must need. Do you think you might be ready to start work tomorrow evening?"

"Most certainly."

"You can have longer if you wish."

"Tomorrow evening will do," she assured.

"Good—I will tell Nathame. He is our chief cultural supervisor and high in governmental affairs. He will call to see you shortly before you begin."

Giving her another wide-jawed and toothy smile, he drove away. She watched him go, then went and inspected her front door which the luggage-bearers had left invitingly open. It was a simple vertical shutter affair wound up and down by a side handle and could be fastened from the inside only by means of a small bolt.

Beyond it lay the passage, solid, motionless, solely to be walked upon and not for automatic transport. And lights that had to be switched because they knew nothing of perpetual illumination. But it was home-to-be.

She stepped inside.

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Nathame came with the twilight on the next day. A sharp-eyed, alert specimen of Zelamite life, he wore glittering insignia on his shoulder-straps, bore himself with authoritative self-assurance. For a while he chatted inconsequentially, his keen gaze never shifting from her face, then added a grumble to the effect that if one person were another world's idea of a hundred it might be better to ask for ten thousand and thus obtain the number really required.

He fell silent for a bit, occupied by his own thoughts, then said: "Before we made contact with other people we had no history but our own. Now we've had to learn the lore of a whole galaxy. It is a record voluminous enough to absorb a lifetime. Nevertheless, I have specialized in it and have learned one thing: that your own particular kind of life is supremely clever."

"Do you think so?" She watched him curiously.

"I do not *think* it. I *know* it." He warmed to his subject. "History records that between sixty and seventy life forms have disappeared from the universal scene. Some warred together and exploded each other's worlds. Some were the victims of cosmic collisions that could be neither foreseen nor avoided. They vanished—*pouf!*—like that! The large majority died when their suns died and warmth went away from them and supernal cold took over." His orange-colored orbs still stared at her unblinking. "It proves one thing: that an entire species can be exterminated and become as though it had never been."

"Not necessarily," she contradicted, "because—"

"Ah!" He held up a hand to halt her. "Of a verity it is for *your* kind to deny the possibility. What or who can wipe out a life form scattered over a hundred million worlds? Nothing! Nobody!"

"I don't think anyone would wish to try."

"Not unless they were completely crazy," he agreed. "You have made yourselves invincible. You have preserved yourselves for eternity. I call that cleverness of the highest order." He pulled a face. "And how have you done it?"

"How do you imagine?" she invited.

"By using your great experience and immense wealth of wisdom to exploit the snobbery of lesser races."

"I don't see it that way."

Ignoring her, he went determinedly on, "Your people anticipated disaster. They foresaw that when your sun collapsed no other planet and no other system could or would accept a sudden influx of refugees numbering thousands of millions. But nobody minds a few dozen or hundreds, especially if they add to their hosts' prestige. Comes the master stroke: you persuade them to scramble for self-esteem like children clamoring for gifts. You made them *want* you."

"But surely—"

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He silenced her again, clasped his hands together in a peculiarly artificial manner, minced across the room and spoke in high-pitched, long-drawn vowels, manifestly imitating a type of character with which she was not yet familiar.

"*Really*, Thasalmie, we wouldn't *dream* of sending *our* children to a *state* school. We've shipped them to the central college at Hei. *Terribly* expensive, of course. They have *Terran* tutors there and it makes *such* a difference in later life when one can say that one has been educated by *Terrans*."

Relaxing into a normal pose, he said, "You see? Since the first Haldisian ships discovered us we've had visits from about twenty life forms. Every one of them took up a patronizing attitude. What, you have no Terrans? By the stars, you must be backward! Why, we have twenty on our world—or forty, or fifty as the case may be." His nostrils twitched as he emitted a loud snort. "They boast and they brag and act so superior that everyone on this world develops a severe inferiority complex and starts screaming for an army of Terrans without delay."

"Braggarts and boasters are not Terran educated," she informed. "We don't produce that kind."

"Maybe you don't, but that's the effect of your presence among those you've not yet taught. They shine in reflected glory. So I say again that you are supremely clever, and on three counts. You are making use of the fact that the more intelligent a people the less they enjoy being thought stupid. Secondly, you have thus insured your own survival for all time. Thirdly, by being content merely to maintain your numbers and not increase them you are also maintaining the confidence of your various hosts. Nobody views with alarm an alien colony that never grows."

She smiled at him and remarked, "All along you've been inviting me to say, 'Look who's talking!' Haven't you?"

"Yes, but you were too diplomatic." Moving nearer and speaking with greater seriousness, he continued, "We asked for a hundred of your kind. Had we got them we would have asked for more. And more again. Not for prestige, but for other and better reasons."

"Such as?"

"We look far ahead. The Haldisians, who know more about it than we, say that ours is a short-term sun. That means an end similar to the end of your world. We must seek the same way out because we can conceive no other. The path your kind has made our kind can tread also. The demand for Terrans is greater than the supply—and there aren't many more of you, are there?"

"Not many," she admitted. "About a million. The old world hasn't long to go."

"Some day we shall be compelled

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to say that, too. It would be nice if by that time the Zelamites had become an acceptable substitute for Terrans." He made an imperative gesture. "So there is your job as far as one can take it. It's a hard job. Starting with our brightest children you must make us clever enough to share your salvation."

"We'll do our best," she promised, deliberately using the plural.

It did not escape him. Even his face could register gratification. Saluting her, he took his departure. Re-angling her mind and directing it exclusively to the task in hand, she hurried along the main corridor, reached the room from which was coming a shrill uproar.

Silence dropped like a heavy curtain as she entered. Taking her place by the desk, she surveyed the hundred small, thin-snouted, slot-eyed faces that in turn were examining her with youthful candidness.

"We shall commence tonight with the basic subject of transcosmic ethics," she informed. Turning around, she faced the dark rectangle that had no counterpart on Terra, picked up the white stick at its base and wrote upon the blackboard in a firm, clear hand.

"Lesson One. Intelligence is like candy. It comes in an endless variety of shapes, sizes and colors, no one of which is less delectable than the others."

She glanced over her shoulder to insure that they were giving attention, found them copying it down, orange eyes intent. One had his tongue out, its purple tip laboriously following the movements of his writing instrument.

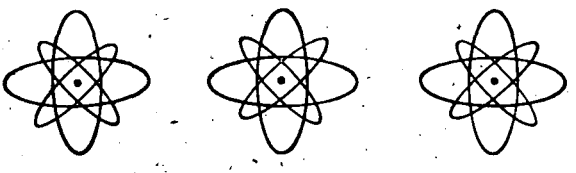
Involuntarily her gaze shifted to the transparent roof through which the galactic host looked down. Somewhere within that gleaming swarm was a little red light, weak and dimming. Somewhere near, to it was another, silvery blue, shining to the very last.

The ancient fountain.

The guiding star.

Old Mother Earth.

THE END



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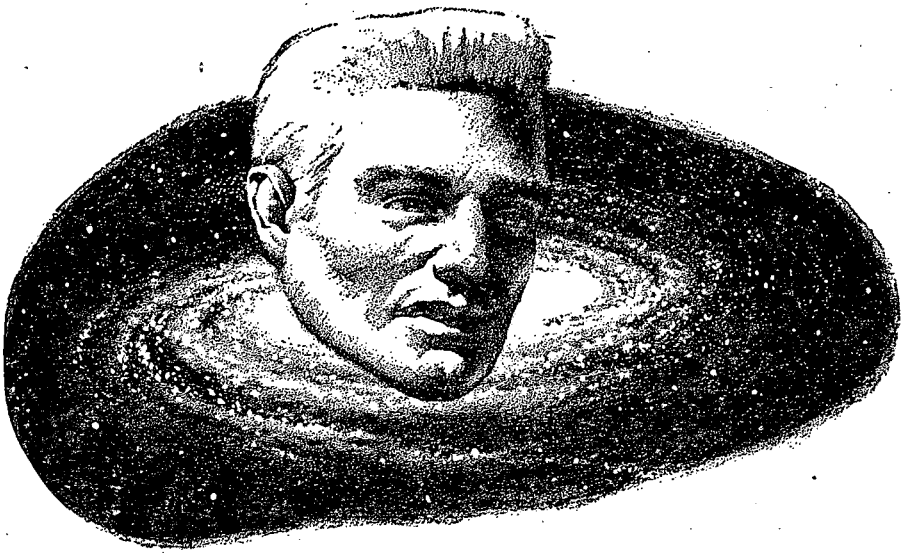

WHAT HAVE I DONE?

BY MARK CLIFTON

When you've finished this bitter little piece, you might decide for yourself whether Clifton's point is valid. But you won't like it!

Illustrated by van Dongen

It had to be I. It would be stupid to say that the burden should have fallen to a great statesman, a world leader, a renowned scientist. With all modesty, I think I am one of the few who could have caught the problem early enough to avert disaster. I have a peculiar skill. The whole thing hinged on that. I have learned to know human beings.

The first time I saw the fellow, I was at the drugstore counter buying cigarettes. He was standing at the magazine rack. One might have thought from the expression on his face that he had never seen magazines before. Still, quite a number of people get that rapt and vacant look when they can't make up their minds to a choice.

The thing which bothered me in that casual glance was that I couldn't

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recognize him.

There are others who can match my record in taking case histories. I happened to be the one who came in contact with this fellow. For thirty years I have been listening to, talking with, counseling people—over two hundred thousand of them. They have not been routine interviews. I have brought intelligence, sensitivity and concern to each of them.

Mine has been a driving, burning desire to know people. Not from the western scientific point of view of devising tools and rules to measure animated robots and ignoring the man beneath. Nor from the eastern metaphysical approach to painting a picture of the soul by blowing one's breath upon a fog to be blurred and dispersed by the next breath.

Mine was the aim to know the man by making use of both. And there was some success.

A competent geographer can look at a crude sketch of a map and instantly orient himself to it anywhere in the world—the bend of a river, the angle of a lake, the twist of a mountain range. And he can mystify by telling in finest detail what is to be found there.

After about fifty thousand studies where I could predict and then observe and check, with me it became the lift of a brow, the curve of a mouth, the gesture of a hand, the slope of a shoulder. One of the universities became interested, and over a long controlled period they rated me ninety-two per cent accurate. That was fifteen years ago. I may have improved some since.

Yet standing there at the cigarette counter and glancing at the young fellow at the magazine rack, I could read nothing. Nothing at all.

If this had been an ordinary face, I would have catalogued it and forgotten it automatically. I see them by the thousands. But this face would not be catalogued nor forgotten, because there was nothing in it.

I started to write that it wasn't even a face, but of course it was. Every human being has a face—of one sort or another.

In build he was short, muscular, rather well proportioned. The hair was crew cut and blond, the eyes were blue, the skin fair. All nice and standard Teutonic—only it wasn't.

I finished paying for my cigarettes and gave him one more glance, hoping to surprise an expression which had some meaning. There was none. I left him standing there and walked out on the street and around the corner. The street, the store fronts, the traffic cop on the corner, the warm sunshine were all so familiar I didn't see them. I climbed the stairs to my office in the building over the drug store. My employment agency waiting room was empty. I don't cater to much of a crowd because it cuts down my opportunity to talk with people and further my study.

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Margie, my receptionist, was busy making out some kind of a report and merely nodded as I passed her desk to my own office. She is a good conscientious girl who can't understand why I spend so much time working with bums and drunks and other psychos who obviously won't bring fees into the sometimes too small bank account.

I sat down at my desk and said aloud to myself, "The guy is a fake! As obvious as a high school boy's drafting of a dollar bill."

I heard myself say that and wondered if I was going nuts, myself. What did I mean by fake? I shrugged. So I happened to see a bird I couldn't read, that was all.

Then it struck me. But that would be unique. I hadn't had that experience for twenty years. Imagine the delight, after all these years, of exploring an unreadable!

I rushed out of my office and back down the stairs to the street. Hallahan, the traffic cop, saw me running up the street and looked at me curiously. I signaled to him with a wave of a hand that everything was all right. He lifted his cap and scratched his head. He shook his head slowly and settled his cap back down. He blew a whistle at a woman driver and went back to directing traffic.

I ran into the drugstore. Of course the guy wasn't there. I looked all around, hoping he was hiding behind the pots and pans counter, or something. No guy.

I walked quickly back out on the street and down to the next corner. I looked up and down the side streets. No guy.

I dragged my feet reluctantly back toward the office. I called up the face again to study it. It did no good. The first mental glimpse of it told me there was nothing to find. Logic told me there was nothing to find. If there had been, I wouldn't be in such a stew. The face was empty—completely void of human feelings or character.

No, those weren't the right words. Completely void of human—being!

I walked on past the drugstore again and looked in curiously, hoping I would see him. Hallahan was facing my direction again, and he grinned crookedly at me. I expect around the neighborhood I am known as a character. I ask the queerest questions of people, from a layman's point of view. Still, applicants sometimes tell me that when they asked a cop where was an employment agent they could trust they were sent to me.

I climbed the stairs again, and walked into my waiting room. Margie looked at me curiously, but she only said, "There's an applicant. I had him wait in your office." She looked like she wanted to say more, and then shrugged. Or maybe she shivered. I knew there was something wrong with the bird, or she would have kept him in the waiting room.

I opened the door to my office, and

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experienced an overwhelming sense of relief, fulfillment. It was he. Still, it was logical that he should be there. I run an employment agency. People come to me to get help in finding work. If others, why not he?

My skill includes the control of my outward reactions. That fellow could have no idea of the delight I felt at the opportunity to get a full history. If I had found him on the street, the best I might have done was a stock question about what time is it, or have you got a match, or where is the city hall. Here I could question him to my heart's content.

I took his history without comment, and stuck to routine questions. It was all exactly right.

He was ex-G.I., just completed college, major in astronomy, no experience, no skills, no faintest idea of what he wanted to do, nothing to offer an employer—all perfectly normal for a young grad.

No feeling or expression either. Not so normal. Usually they're petulantly resentful that business doesn't swoon at the chance of hiring them. I resigned myself to the old one-two of attempting to steer him toward something practical.

"Astronomy?" I asked. "That means you're heavy in math. Frequently we can place a strong math skill in statistical work." I was hopeful I could get a spark of something.

It turned out he wasn't very good at math. "I haven't yet reconciled my math to—" he stopped. For the first time he showed a reaction—hesitancy. Prior to that he had been a statue from Greece—the rounded expressionless eyes, the too perfect features undisturbed by thought.

He caught his remark and finished, "I'm just not very good at math, that's all."

I sighed to myself. I'm used to that, too. They give degrees nowadays to get rid of the guys, I suppose. Sometimes I'll go for days without uncovering any usable knowledge. So in a way, that was normal.

The only abnormal part of it was he seemed to think it didn't sound right. Usually the lads don't even realize they should know something. He seemed to think he'd pulled a boner by admitting that a man can take a degree in astronomy without learning math. Well, I wouldn't be surprised to see them take their degree without knowing how many planets there are.

He began to fidgit a bit. That was strange, also. I thought I knew every possible combination of muscular contractions and expansions. This fidgit had all the reality of a puppet activated by an amateur. And the eyes—still completely blank.

I led him up one mental street and down the next. And of all the false-fronted stores and cardboard houses and paper lawns, I never saw the like. I get something of that once in a while from a fellow who has spent a long

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term in prison and comes in with a manufactured past—but never anything as phony as this one was.

Interesting aspect to it. Most guys, when they realize you've spotted them for a phony, get out as soon as they can. He didn't. It was almost as though he were—well testing; to see if his answers would stand up.

I tried talking astronomy, of which I thought I knew a little. I found I didn't know anything, or he didn't. This bird's astronomy and mine had no point of reconciliation.

And then he had a slip of the tongue—yes he did. He was talking, and said, "The ten planets—"

He caught himself, "Oh that's right. There's only nine."

Could be ignorance, but I didn't think so. Could be he knew of the existence of a planet we hadn't yet discovered.

I smiled. I opened a desk drawer and pulled out a couple science-fiction magazines. "Ever read any of these?" I asked.

"I looked through several of them at the newsstand a while ago," he answered.

"They've enlarged my vision," I said. "Even to the point where I could believe that some other star system might hold intelligence." I lit a cigarette and waited. If I was wrong, he would merely think I was talking at random.

His blank eyes changed. They were no longer Greek statue eyes. They were no longer blue. They were black, deep bottomless black, as deep and cold as space itself.

"Where did I fail in my test?" he asked. His lips formed a smile which was not a smile—a carefully painted-on-canvas sort of smile.

Well, I'd had my answer. I'd explored something unique, all right. Sitting there before me, I had no way of determining whether he was benign or evil. No way of knowing his motive. No way of judging—anything. When it takes a lifetime of learning how to judge even our own kind, what standards have we for judging an entity from another star system?

At that moment I would like to have been one of those space-opera heroes who, in similar circumstances, laugh casually and say, "What ho! So you're from Arcturus. Well, well. It's a small universe after all, isn't it?" And then with linked arms they head for the nearest bar, bosom pals.

I had the almost hysterical thought, but carefully suppressed, that I didn't know if this fellow would like beer or not. I will not go through the intermuscular and visceral reactions I experienced. I kept my seat and maintained a polite expression. Even with humans, I know when to walk carefully.

"I couldn't feel anything about you," I answered his question. "I couldn't feel anything but blankness."

He looked blank. His eyes were nice blue marble again. I liked them better that way.

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There should be a million questions to be asked, but I must have been bothered by the feeling that I held a loaded bomb in my hands. And not knowing what might set it off, or how, or when. I could think of only the most trivial.

"How long have you been on Earth?" I asked. Sort of a when did you get back in town, Joe, kind of triviality.

"For several of your weeks," he was answering. "But this is my first time out among humans."

"Where have you been in the meantime?" I asked.

"Training." His answers were getting short and his muscles began to fidgit again.

"And where do you train?" I kept boring in.

As an answer he stood up and held out his hand, all quite correctly. "I must go now," he said. "Naturally you can cancel my application for employment. Obviously we have more to learn."

I raised an eyebrow. "And I'm supposed to just pass over the whole thing? A thing like this?"

He smiled again. The contrived smile which was a symbol to indicate courtesy. "I believe your custom on this planet is to turn your problems over to your police. You might try that." I could not tell whether it was irony or logic.

At that moment I could think of nothing else to say. He walked out of my door while I stood beside my desk and watched him go.

Well, what was I supposed to do? Follow him?

I followed him.

Now I'm no private eye, but I've read my share of mystery stories. I knew enough to keep out of sight. I followed him about a dozen blocks into a quiet residential section of small homes. I was standing behind a palm tree, lighting a cigarette, when he went up the walk of one of these small houses. I saw him twiddle with the door, open it, and walk in. The door closed.

I hung around a while and then went up to the door. I punched the doorbell. A motherly gray-haired woman came to the door, drying her hands on her apron. As she opened the door she said, "I'm not buying anything today."

Just the same, her eyes looked curious as to what I might have.

I grinned my best grin for elderly ladies. "I'm not selling anything, either," I answered. I handed her my agency card. She looked at it curiously and then looked a question at me.

"I'd like to see Joseph Hoffman," I said politely.

She looked puzzled. "I'm afraid you've got the wrong address, sir," she answered.

I got prepared to stick my foot in the door, but it wasn't necessary. "He was in my office just a few minutes

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ago," I said. "He gave that name and this address. A job came in right after he left the office, and since I was going to be in this neighborhood anyway, I thought I'd drop by and tell him in person. It's sort of rush," I finished. It had happened many times before, but this time it sounded lame.

"Nobody lives here but me and my husband," she insisted. "He's retired."

I didn't care if he hung by his toes from trees. I wanted a young fellow.

"But I saw the young fellow come in here," I argued. "I was just coming around the corner, trying to catch him. I saw him."

She looked at me suspiciously. "I don't know what your racket is," she said through thin lips, "but I'm not buying anything. I'm not signing anything. I don't even want to talk to you." She was stubborn about it.

I apologized and mumbled something about maybe making a mistake.

"I should say you have," she rapped out tartly and shut the door in righteous indignation. Sincere, too. I could tell.

An employment agent who gets the reputation of being a right guy makes all kinds of friends. That poor old lady must have thought a plague of locusts had swept in on her for the next few days.

First the telephone repair man had to investigate an alleged complaint. Then a gas service man had to check the plumbing. An electrician explained there was a power short in the block and he had to trace their house wiring. We kept our fingers crossed hoping the old geezer had never been a construction man. There was a mistake in the last census, and a guy asked her a million questions.

That house was gone over rafter by rafter and sill by sill, attic and basement. It was precisely as she said. She and her husband lived there; nobody else.

In frustration, I waited three months. I wore out the sidewalks haunting the neighborhood. Nothing.

Then one day my office door opened and Margie ushered a young man in. Behind his back she was radiating heart throbs and fluttering her eyes.

He was the traditionally tall, dark and handsome young fellow, with a ready grin and sparkling dark eyes. His personality hit me like a sledge hammer. A guy like that never needs to go to an employment agency. Any employer will hire him at the drop of a hat, and wonder later why he did it.

His name was Einar Johnson. Extraction, Norwegian. The dark Norse strain, I judged. I took a chance on him thinking he had walked into a booby hatch.

"The last time I talked with you," I said, "your name was Joseph Hoffman. You were Teutonic then. Not Norse."

The sparkle went out of his eyes. His face showed exasperation and there was plenty of it. It looked real,

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too, not painted on.

"All right. Where did I flunk this time?" he asked impatiently.

"It would take me too long to tell you," I answered. "Suppose you start talking." Strangely, I was at ease. I knew that underneath he was the same incomprehensible entity, but his surface was so good that I was lulled.

He looked at me levelly for a long moment. Then he said, "I didn't think there was a chance in a million of being recognized. I'll admit that other character we created was crude. We've learned considerable since then, and we've concentrated everything on this personality I'm wearing."

He paused and flashed his teeth at me. I felt like hiring him, myself. "I've been all over Southern California in this one," he said. "I've had a short job as a salesman. I've been to dances and parties. I've got drunk and sober again. Nobody, I say—nobody, has shown even the slightest suspicion."

"Not very observing, were they?" I taunted.

"But you are," he answered. "That's why I came back here for the final test. I'd like to know where I failed." He was firm.

"We get quite a few phonies," I answered. "The guy drawing unemployment and stalling until it is run out. The geezik whose wife drives him out and threatens to quit her job if he doesn't go to work. The plain-clothes detail smelling around to see if maybe we aren't a cover for a bookie joint or something. Dozens of phonies."

He looked curious. I said in disgust. "We know in the first two minutes they're phony. You were phony also, but not of any class I've seen before. And," I finished dryly, "I've been waiting for you."

"Why was I phony?" he persisted.

"Too much personality force," I answered. "Human beings just don't have that much force. I felt like I'd been knocked flat on my . . . well . . . back."

He sighed. "I've been afraid you would recognize me one way or another. I communicated with home. I was advised that if you spotted me, I was to instruct you to assist us."

I lifted a brow. I wasn't sure just how much authority they had to instruct me to do anything.

"I was to instruct you to take over the supervision of our final training, so that no one could ever spot us. If we are going to carry out our original plan that is necessary. If not, then we will have to use the alternate." He was almost didactic in his manner, but his charm of personality still radiated like an infrared lamp.

"You're going to have to tell me a great deal more than that," I said.

He glanced at my closed door.

"We won't be interrupted," I said. "A personnel history is private."

"I come from one of the planets of

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Arcturus," he said.

I must have allowed a smile of amusement to show on my face, for he asked, "You find that amusing?"

"No," I answered soberly, and my pulses leaped because the question confirmed my conclusion that he could not read my thoughts. Apparently we were as alien to him as he to us. "I was amused," I explained, "because the first time I saw you I said to myself that as far as recognizing you, you might have come from Arcturus. Now it turns out that accidentally I was correct. I'm better than I thought."

He gave a fleeting polite smile in acknowledgment. "My home planet," he went on, "is similar to yours. Except that we have grown overpopulated."

I felt a twinge of fear.

"We have made a study of this planet and have decided to colonize it." It was a flat statement, without any doubt behind it.

I flashed him a look of incredulity. "And you expect me to help you with that?"

He gave me a worldly wise look—almost an ancient look. "Why not?" he asked.

"There is the matter of loyalty to my own kind, for one thing," I said. "Not too many generations away and we'll be overpopulated also. There would hardly be room for both your people and ours on Earth."

"Oh that's all right," he answered easily. "There'll be plenty of room for us for quite some time. We multiply slowly."

"We don't," I said shortly. I felt this conversation should be taking place between him and some great statesman—not me.

"You don't seem to understand," he said patiently. "Your race won't be here. We have found no reason why your race should be preserved. You will die away as we absorb."

"Now just a moment," I interrupted. "I don't want our race to die off." The way he looked at me I felt like a spoiled brat who didn't want to go beddie time.

"Why not?" he asked.

I was stumped. That's a good question when it is put logically. Just try to think of a logical reason why the human race should survive. I gave him at least something.

"Mankind," I said, "has had a hard struggle. We've paid a tremendous price in pain and death for our growth. Not to have a future to look forward to, would be like paying for something and never getting the use of it."

It was the best I could think of, honest. To base argument on humanity and right and justice and mercy would leave me wide open. Because it is obvious that man doesn't practice any of these. There is no assurance he ever will.

But he was ready for me, even with that one. "But if we are never suspected, and if we absorb and replace

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gradually, who is to know there is no future for humans?"

And as abruptly as the last time, he stood up suddenly. "Of course," he said coldly, "we could use our alternative plan: Destroy the human race without further negotiation. It is not our way to cause needless pain to any life form. But we can.

"If you do not assist us, then it is obvious that we will eventually be discovered. You are aware of the difficulty of even blending from one country on Earth to another. How much more difficult it is where there is no point of contact at all. And if we are discovered, destruction would be the only step left."

He smiled and all the force of his charm hit me again. "I know you will want to think it over for a time. I'll return."

He walked to the door, then smiled back at me. "And don't bother to trouble that poor little woman in that house again. Her doorway is only one of many entrances we have opened. She doesn't see us at all, and merely wonders why her latch doesn't work sometimes. And we can open another, anywhere, anytime. Like this—"

He was gone.

I walked over and opened the door. Margie was all prettied up and looking expectant and radiant. When she didn't see him come out she got up and peeked into my office. "But where did he go?" she asked with wide eyes.

"Get hold of yourself, girl," I answered. "You're so dazed you didn't even see him walk right by you."

"There's something fishy going on here," she said.

Well, I had a problem. A first rate, genuine, dyed in the wool dilemma.

What was I to do? I could have gone to the local authorities and got locked up for being a psycho. I could have gone to the college professors and got locked up for being a psycho. I could have gone to maybe the FBI and got locked up for being a psycho. That line of thinking began to get monotonous.

I did the one thing which I thought might bring help. I wrote up the happenings and sent it to my favorite science-fiction magazine. I asked for help and sage counsel from the one place I felt awareness and comprehension might be reached.

The manuscript bounced back so fast it might have had rubber bands attached to it, stretched from California to New York. I looked the little rejection slip all over, front and back, and I did not find upon it those sage words of counsel I needed. There wasn't even a printed invitation to try again some time.

And for the first time in my life I knew what it was to be alone—genuinely and irrevocably alone.

Still, I could not blame the editor.

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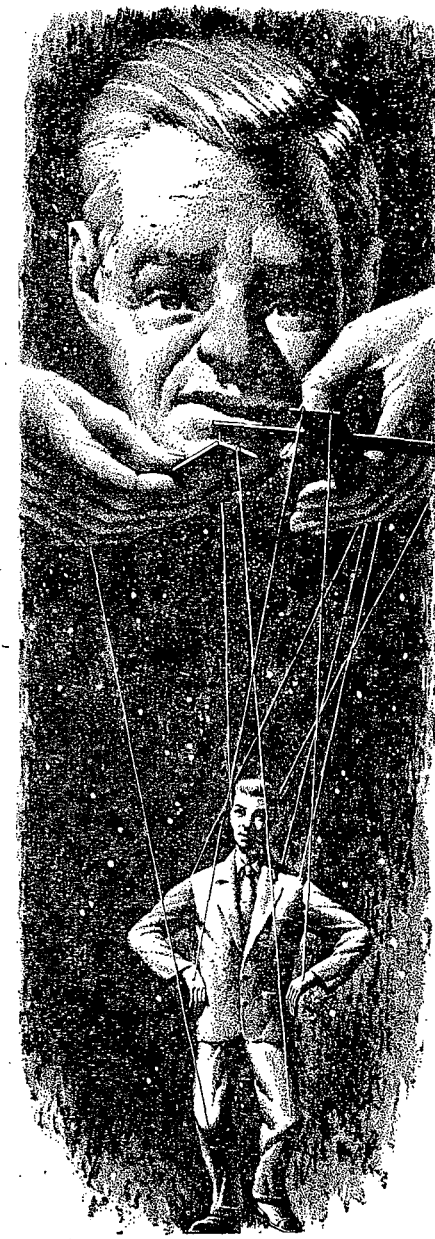
I could see him cast the manuscript from him in disgust, saying, "Bah! So another evil race comes to conquer Earth. If I gave the fans one more of those, I'd be run out of my office." And like the deacon who saw the naughty words written on the fence, saying, "And misspelled, too."

The fable of the boy who cried "Wolf! Wolf!" once too often came home to me now. I was alone with my problem. The dilemma was my own. On one hand was immediate extermination. I did not doubt it. A race which can open doors from one star system to another, without even visible means of mechanism, would also know how to—disinfect.

On the other hand was extinction, gradual, but equally certain, and none the less effective in that it would not be perceived. If I refused to assist, then acting as one lone judge of all the race, I condemned it. If I did assist, I would be arch traitor, with an equal final result.

For days I sweltered in my miasma of indecision. Like many a man before me, uncertain of what to do, I temporized. I decided to play for time. To play the role of traitor in the hopes I might learn a way of defeating them.

Once I had made up my mind, my thoughts raced wildly through the possibilities. If I were to be their instructor on how to walk unsuspected among men, then I would have them wholly in my grasp. If I could build traits into them, common ordinary



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traits which they could see in men all about them, yet which would make men turn and destroy them, then I would have my solution.

And I knew human beings. Perhaps it was right, after all, that it became my problem. Mine alone.

I shuddered now to think what might have happened had this being fallen into less skilled hands and told his story. Perhaps by now there would be no man left upon Earth.

Yes, the old and worn-out plot of the one little unknown guy who saved Earth from outer evil might yet run its course in reality.

I was ready for the Arcturan when he returned. And he did return.

Einar Johnson and I walked out of my office after I had sent a tearful Margie on a long vacation with fancy pay. Einar had plenty of money, and was liberal with it. When a fellow can open some sort of fourth-dimensional door into a bank vault and help himself, money is no problem.

I had visions of the poor bank clerks trying to explain things to the examiners, but that wasn't my worry right now.

We walked out of the office and I snapped the lock shut behind me. Always conscious of the cares of people looking for work, I hung a sign on the door saying I was ill and didn't know when I would be back.

We walked down the stairs and into the parking lot. We got into my car, my own car, please note, and I found myself sitting in a sheltered patio in Beverly Hills. Just like that. No awful wrenching and turning my insides out. No worrisome nausea and emptiness of space. Nothing to dramatize it at all. Car—patio, like that.

I would like to be able to describe the Arcturans as having long snaky appendages and evil slobbering maws, and stuff like that. But I can't describe the Arcturans, because I didn't see any.

I saw a gathering of people, roughly about thirty of them, wandering around the patio, swimming in the pool, going in and out of the side doors of the house. It was a perfect spot. No one bothers the big Beverly Hills home without invitation.

The natives wouldn't be caught dead looking toward a star's house. The tourists see the winding drive, the trees and grass, and perhaps a glimpse of a gabled roof. If they can get any thrill out of that then bless their little spending money hearts, they're welcome to it.

Yet if it should become known that a crowd of strange acting people are wandering around in the grounds, no one would think a thing about it. They don't come any more zany than the Hollywood crowd.

Only these were. These people could have made a fortune as life-size puppets. I could see now why it was judged that the lifeless Teutonic I had first interviewed was thought ade-

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quate to mingle with human beings. By comparison with these, he was a snappy song and dance man.

But that is all I saw. Vacant bodies wandering around, going through human motions, without human emotions. The job looked bigger than I had thought. And yet, if this was their idea of how to win friends and influence people, I might be successful after all.

There are dozens of questions the curious might want answered—such as how did they get hold of the house and how did they get their human bodies and where did they learn to speak English, and stuff. I wasn't too curious. I had important things to think about. I supposed they were able to do it, because here it was.

I'll cut the following weeks short. I cannot conceive of what life and civilization on their planet might be like. Yardsticks of scientific psychology are used to measure a man, and yet they give no indication at all of the inner spirit of him, likewise, the descriptive measurements of their civilization are empty and meaningless. Knowing about a man, and knowing a man are two entirely different things.

For example, all those thalamic urges and urgencies which we call emotion were completely unknown to them, except as they saw them in antics on TV. The ideals of man were also unknown—truth, honor, justice, perfection—all unknown. They had not even a division of sexes, and the emotion we call love was beyond their understanding. The TV stories they saw must have been like watching a parade of ants.

What purpose can be gained by describing such a civilization to man? Man cannot conceive accomplishment without first having the dream. Yet it was obvious that they accomplished, for they were here.

When I finally realized there was no point of contact between man and these, I knew relief and joy once more. My job was easy. I knew how to destroy them. And I suspected they could not avoid my trap.

They could not avoid my trap because they had human bodies. Perhaps they conceived them out of thin air, but the veins bled, the flesh felt pain and heat and pressure, the glands secreted.

Ah yes, the glands secreted. They would learn what emotion could be. And I was a master at wielding emotion. The dream of man has been to strive toward the great and immortal ideals. His literature is filled with admonishments to that end. In comparison with the volume of work which tells us what we should be, there is very little which reveals us as we are.

As part of my training course, I chose the worlds great literature, and painting, and sculpture, and music—those mediums which best portray man lifting to the stars. I gave them

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first of all, the dream.

And with the dream, and with the pressure of the glands as kicker, they began to know emotion. I had respect for the superb acting of Einar when I realized that he, also, had still known no emotion.

They moved from the puppet to the newborn babe—a newborn babe in training, with an adult body, and its matured glandular equation.

I saw emotions, all right. Emotions without restraint, emotions unfettered by taboos, emotions uncontrolled by ideals. Sometimes I became frightened and all my skill in manipulating emotions was needed. At other times they became perhaps a little too Hollywood, even for Hollywood. I trained them into more ideal patterns.

I will say this for the Arcturans. They learned—fast. The crowd of puppets to the newborn babes, to the boisterous boys and girls, to the moody and unpredictable youths, to the matured and balanced men and women. I watched the metamorphosis take place over the period of weeks.

I did more.

All that human beings had ever hoped to be, the brilliant, the idealistic, the great in heart, I made of these. My little 145 I.Q. became a moron's level. The dreams of the greatness of man which I had known became the vaguest wisps of fog before the reality which these achieved.

My plan was working.

Full formed, they were almost like gods. And training these things into them, I trained their own traits out. One point I found we had in common. They were activated by logic, logic carried to heights of which I had never dreamed. Yet my poor and halting logic found point of contact.

They realized at last that if they let their own life force and motivation remain active they would carry the aura of strangeness to defeat their purpose. I worried, when they accepted this. I felt perhaps they were laying a trap for me, as I did for them. Then I realized that I had not taught them deceit.

And it was logical, to them, that they follow my training completely. Reversing the position, placing myself upon their planet, trying to become like them, I must of necessity follow my instructor without question. What else could they do?

At first they saw no strangeness that I should assist them to destroy my race. In their logic the Arcturan was most fit to survive, therefore he should survive. The human was less fit, therefore he should perish.

I taught them the emotion of compassion. And when they began to mature their human thought and emotion, and their intellect was blended and shaded by such emotion, at last they understood my dilemma.

There was irony in that. From my own kind I could expect no understanding. From the invaders I received

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sympathy and compassion. They understand at last my traitorous action to buy a few more years for Man.

Yet their Arcturan logic still prevailed. They wept with me, but there could be no change of plan. The plan was fixed, they were merely instruments by which it was to be carried out.

Yet, through their compassion, I did get the plan modified.

This was the conversation which revealed that modification. Einar Johnson, who as the most fully developed had been my constant companion, said to me one day, "To all intents and purposes we have become human beings." He looked at me and smiled with fondness, "You have said it is so, and it must be so. For we begin to realize what a great and glorious thing a human is."

The light of nobility shone from him like an aura as he told me this, "Without human bodies, and without the emotion-intelligence equation which you call soul, our home planet cannot begin to grasp the growth we have achieved. We know now that we will never return to our own form, for by doing that we would lose what we have gained.

"Our people are logical, and they must of necessity accept our recommendation, as long as it does not abandon the plan entirely. We have reported what we have learned, and it is conceived that both our races can inhabit the Universe side by side.

"There will be no more migration from our planet to yours. We will remain, and we will multiply, and we will live in honor, such as you have taught us, among you. In time perhaps we may achieve the greatness which all humans now have.

"And we will assist the human kind to find their destiny among the stars as we have done."

I bowed my head and wept. For I knew that I had won.

Four months had gone. I returned to my own neighborhood. On the corner Hallahan left the traffic to shift for itself while he came over to me with the question, "Where have you been?"

"I've been sick," I said.

"You look it," he said frankly. "Take care of yourself, man. Hey—Lookit that fool messing up traffic." He was gone, blowing his whistle in a temper.

I climbed the stairs. They still needed repainting as much as ever. From time to time I had been able to mail money to Margie, and she had kept the rent and telephone paid. The sign was still on my door. My key opened the lock.

The waiting room had that musty, they've-gone-away look about it. The janitor had kept the windows tightly closed and there was no freshness in the air. I half hoped to see Margie sitting at her desk, but I knew there was no purpose to it. When a girl is

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being paid for her time and has nothing to do, the beach is a nice place to spend it.

There was dust on my chair, and I sank down into it without bothering about the seat of my pants. I buried my head in my arms and I looked into the human soul.

Now the whole thing hinged on that skill. I know human beings. I know them as well as anyone in the world, and far better than most.

I looked into the past and I saw a review of the great and fine and noble and divine torn and burned and crucified by man.

Yet my only hope of saving my race was to build these qualities, the fine, the noble, the splendid, into these thirty beings. To create the illusion that all men were likewise great. No less power could have gained the boon of equality for man with them.

I look into the future. I see them, one by one, destroyed. I gave them no defense. They are totally unprepared to meet man as he genuinely is—and they are incapable of understanding.

For these things which man purports to admire the most—the noble, the brilliant, the splendid—these are the very things he cannot tolerate when he finds them.

Defenseless, because they cannot comprehend, these thirty will go down beneath the ravening fury of rending and destroying man always displays whenever he meets his ideal face to face.

I bury my head in my hands.

What have I done?

THE END

IN TIMES TO COME

Next month's issue has a cover by van Dongen on the story "The Specter General," by Theodore R. Cogswell. Cogswell has an amusing—and highly intriguing yarn; van Dongen proceeds to demonstrate that there are a lot of new ways art can be used in science-fiction. Cogswell has set up the fine situation of a Galactic Empire falling apart—which is old. But the military base where the story is laid has the weirdest conglomeration of misplaced and left-over customs, techniques and concepts I've ever enjoyed encountering.

Perfectly logical, too; an outpost military base is not, and never was, intended to be a self-contained, consistent whole; it's part of a larger system—or is supposed to be. But what happens to such an unbalanced setup if somebody forgets it's there . . . ?

THE EDITOR.

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RUDYARD KIPLING: SCIENCE-FICTIONEER

Because Astounding SCIENCE-FICTION does not go in for reprinting stories, we do not bring to the attention of the science-fiction audience many of the stories of the past that were, in fact, excellent science fiction, and have been almost wholly forgotten.

Rudyard Kipling is most famous for his stories and poems of India; that he wrote excellent science-fiction novelettes and short stories is almost overlooked. In truth, Kipling is the only man who wrote science-fiction yarns, previous to 1900, that would be suitable for use in the pages of Astounding SCIENCE-FICTION today. The man was really ahead of his time.

Kipling's best science fiction bears an astonishing resemblance in mood, and general approach of treatment, to the work of Robert Heinlein. This is not due to Heinlein mimicking Kipling, but to the fact that two authors, approaching the same problem, both highly competent, are forced by the Nature of Things As They Are, to similar conclusions, and similar techniques.

Kipling, far better than H. G. Wells, Jules Verne, or Conan Doyle, analyzed the problems of presenting science fiction, resolved the problem, and devised an appropriate answer. His approach to the problem was not matched to the tastes of his own era; it is matched to the understandings of an era more than half a century later.

Try at your local libraries for Kipling collections containing "With The Night Mail," "Easy As ABC," "007" and "The Ship That Found Herself." Each of these — as well as a number of other Kipling stories — is science fiction.

Undoubtedly, there are a number of other stories, by other authors, written many years ago, that could compete with the best modern science fiction. Some I know of; many, I am sure, I do not. Can anyone suggest other stories which, like Kipling's, fulfill these requirements:

Their science-fiction interest is *not* merely that they were early science fiction — but that they are *good* science fiction, in the fullest modern sense, capable of standing up to modern standards.

That they are also good, human stories, by the standards of good general writing interest.

That they have been generally overlooked — but are available in some degree in libraries, or secondhand book stores.

I think all science-fictioneers would like to know of them; how about writing Brass Tacks about it?

THE EDITOR

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An ASF Factual Article

BROOKHAVEN ACTION

***Brookhaven** National Laboratory is a research center for advanced nuclear physics. There's a nuclear reactor—but that's far from the whole story, and the use of a nuclear reactor isn't just a simple uranium fission research business, either!*

BY JOHN W. CAMPBELL, JR.

Photographs: Brookhaven National Laboratory

In the July, 1949 issue, we carried the "Brookhaven Sketches" series—and the cover painting by Hubert Rogers of the Brookhaven Atomic Pile.* In the two-plus years since, the Brookhaven reactor has been completed, and has been in action. The work at Brookhaven, because it is research, not production, will never be completed; there will always be something under construction, something still to be done, a new instrument to be built.

The days of research on a scale that one man, or a one-man company could finance are over in the field of basic physics. Physics generally divides into two broad approaches; the theoretical research that is done with paper, pencil, and imagination, and the field of basic physics, which is done with the actual working materials.

It must be remembered—and is commonly overlooked completely—that no science exists in the real world of matter, light, photons, et cetera. Atoms have no science; they simply have properties. Science is purely a human mental function; it is *not* a real existent object, but a humanly conceived system of beliefs which are intended to correspond one-to-one with the real objects described. Physics, as a science, exists solely in human minds; this field of physics is, and always will be, something that can be carried out only in and by human minds.

Basic physics, on the other hand, is the business of measuring the properties of atoms, and never has been,

*That cover original, incidentally, is now hanging at the Brookhaven Administration Building, on Long Island.

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never is, and never can be carried out in a human mind, or in any other way than by working with real objects and effects.

It is necessary to have the material equipment to measure material reality; no amount of theory means anything whatsoever, save as mental exercise. Theory acquires value when, and only when, material demonstration shows it to be useful. A madman can theorize that gravity has no effect on him if he crosses his little fingers just *so;* he is not a madman, but a great genius if he can make the theory useful in fact.

One of the great errors the German physicists and theoreticians made dur-

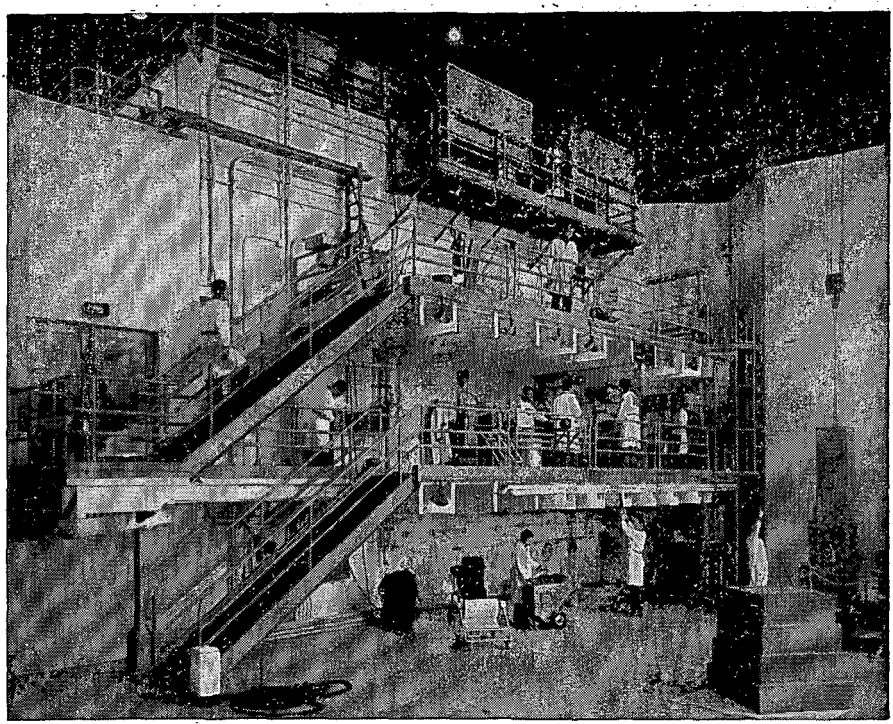

Fig. 1. The Brookhaven Reactor. All six faces—the four sides and the top and bottom as well —are accessible as research areas, the bottom being reached through tunnels. This highly posed photograph illustrates the research use of the reactor; for security reasons actual use cannot be shown. The high, blank walls to left and right are shielding walls—but security shielding, not radiation shielding. Actual work was going on at the other faces when this photograph was taken. The round portholes are access openings; neutron gas can be withdrawn from them, or samples for irradiation can be inserted.

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ing the last war was to confine themselves to theory; their theoretical work was excellent. After Hiroshima Heisenberg, who had led German nuclear physics, was able to deduce with great precision what, exactly, had been done, and how. But during the war, Germany had no cyclotron; the only cyclotron the German theoreticians had access to was one built by the French, and captured by them.

Brookhaven, the Argonne Laboratories, Los Alamos, all the installations of the Atomic Energy Commission represent Basic Physics. The tools needed to penetrate deeper into the nature of the Universe have become ever more massive, ever more expensive. Naturally in the course of the development of physics, the less expensive apparatus was constructed first; as its limits were explored, something capable of deeper penetration offered the only means of advance.

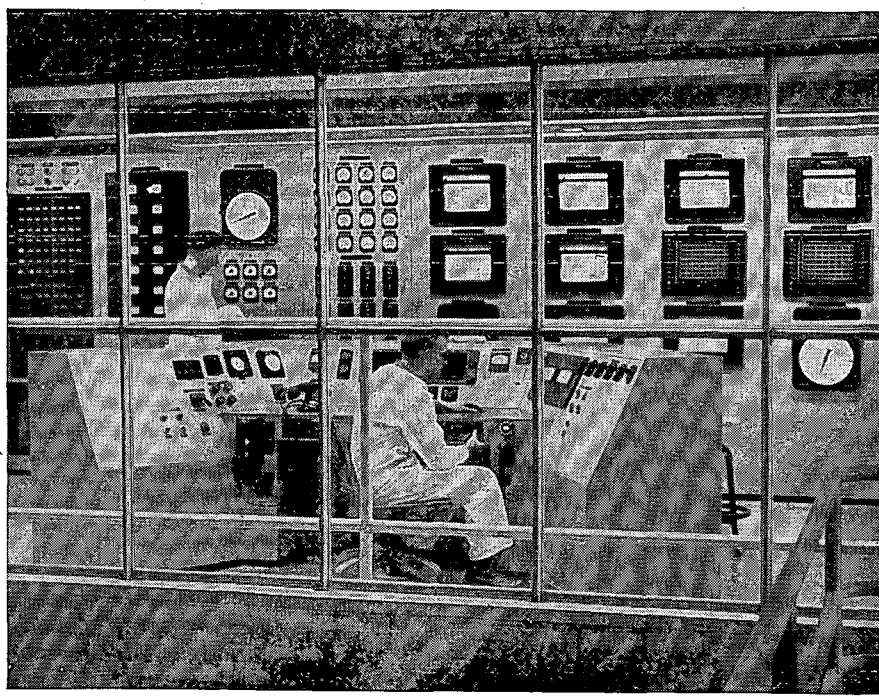

Fig. 2. The control desk for the Brookhaven Reactor. The nuclear engineer in charge is seated at the control console, while an assistant checks and notes some of the instrument readings. The major reaction factors are automatically recorded for later cross-checking with each other and with results measured in different experiments on the reactor faces.

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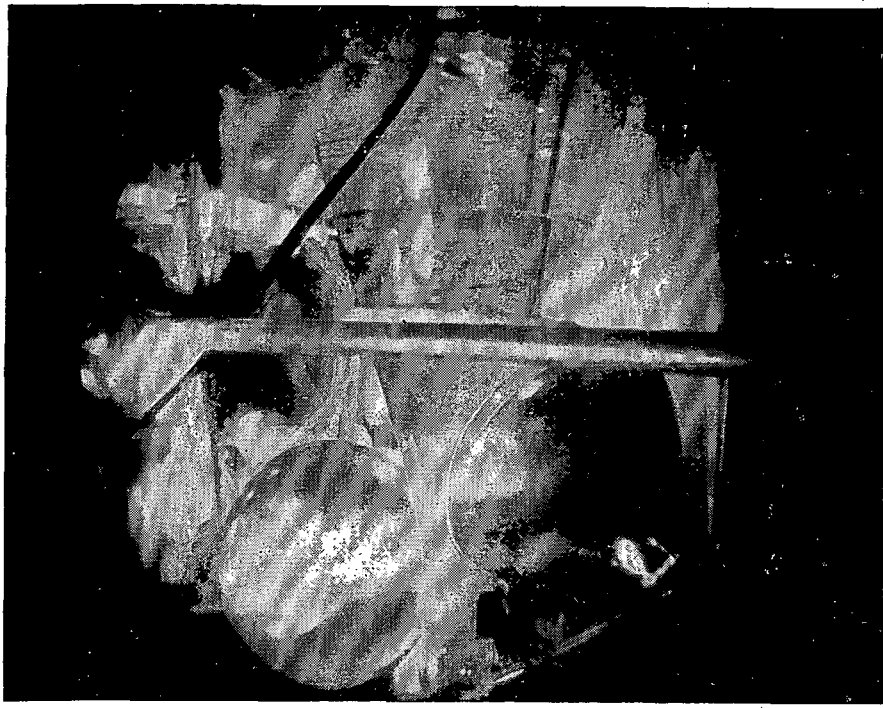

Fig. 3. The inside of a Hot Cell at Brookhaven. Infrared lamps are used for heating solutions, because of ease of remote control. The view is taken through a periscope; twelve inches of solid stainless steel blocks direct view—and radiations that can't turn corners, or bounce off periscope mirrors. This is not the easiest way to conduct chemistry; it is the only way for the chemist to continue both his work and his living, however!

The multi-billion investments of the United States are the inevitable answer; only the deep technical interest of a people which has, long since, put its basic faith in the power of research could produce such tools.

Once, Edison was able to represent, as a one-man company, the major forefront of basic physics; today immense teams are required; the snowball effect is a double-barreled effect. Not only does the snowball grow as it goes; it demands more and more effort to keep it going and growing. And that increased effort must be concentrated effort. The diffuse effort of ten thousand men working on ten thousand projects cannot produce the same effect that ten thousand men working on ten gigantic projects can.

Brookhaven, because it happens to be relatively close to the editorial

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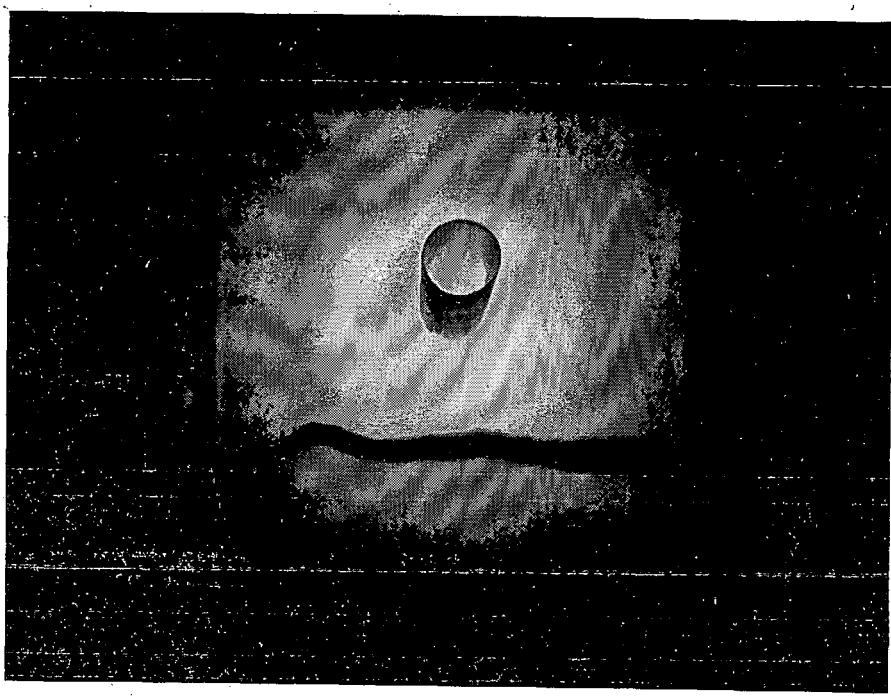

Fig. 4. A one thousand curie radiation source under eight feet of ordinary water—photographed by the light generated as its violent radiation makes the water glow blue all around it. The source is a thin-walled metal tube which has been heavily exposed to neutron gas in the reactor; it is resting on a wooden platform which rests on the bottom of the tank. Two ordinary ropes are attached to the platform to retrieve it. The view is directly downward, taken with a somewhat telescopic lens that shortens the apparent distance.

offices of Astounding SCIENCE FICTION, has been the sample project we've watched most closely. Also, Brookhaven is largely a nonsecret project. Security clearance is unnecessary for ninety per cent of the Brookhaven areas. This does *not* mean that the Brookhaven Laboratories can be conducted with a steady flow of visitors passing through—no laboratory can. But it does mean that reasonable press visitations can be allowed; necessarily the same cannot hold true of Los Alamos, Hanford Works, and the like.

The facilities of Brookhaven necessarily represent the sort of investment that cannot be repeated endlessly; Brookhaven, therefore, serves several distinct functions simultaneously. The Nuclear Reactor must be used for investigation of the basic physics of

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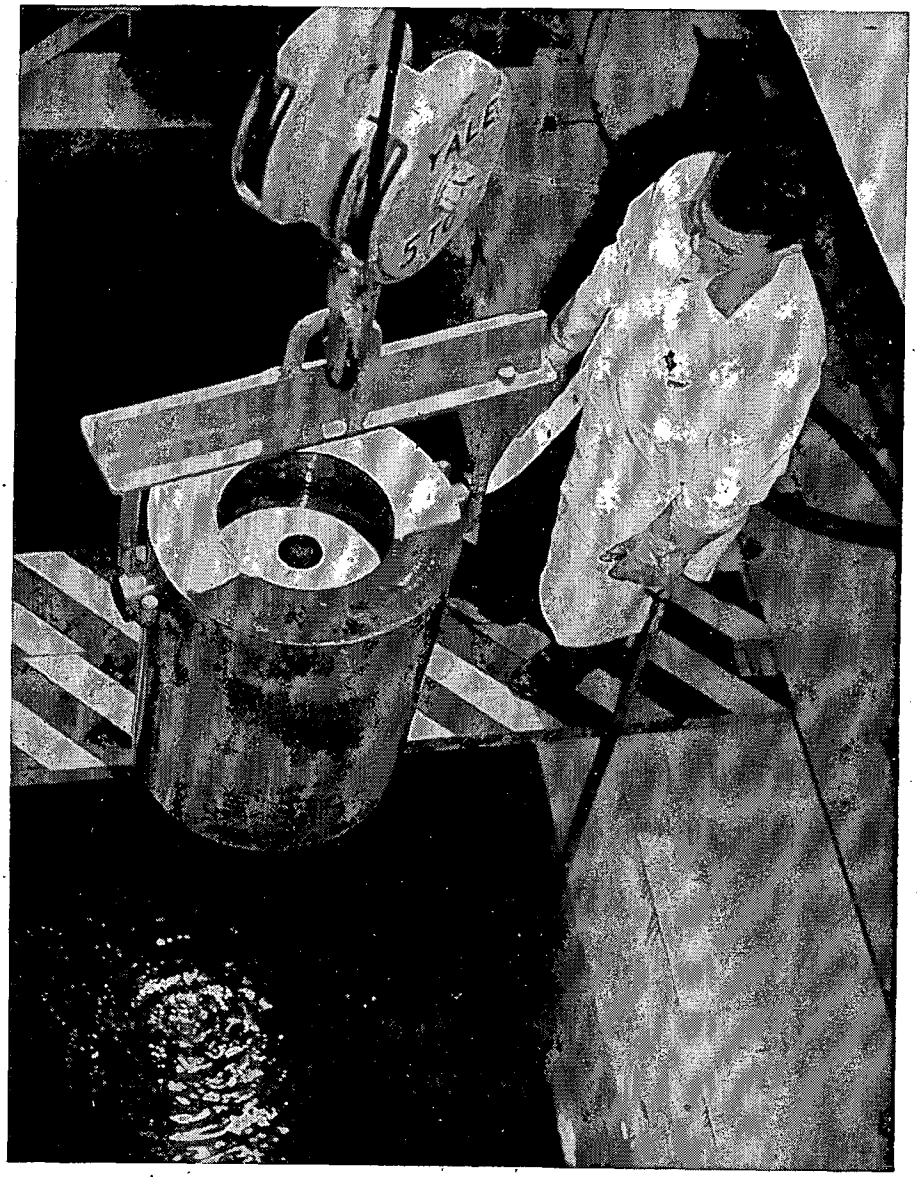

Fig. 5. The one kilocurie radiation source is normally moved inside a one and one fourth ton lead shield. The source itself weighs a few ounces—but ton masses of the densest matter are needed to block its lethal radiations. The camera taking Figure 4 was looking down into the water tank shown here.

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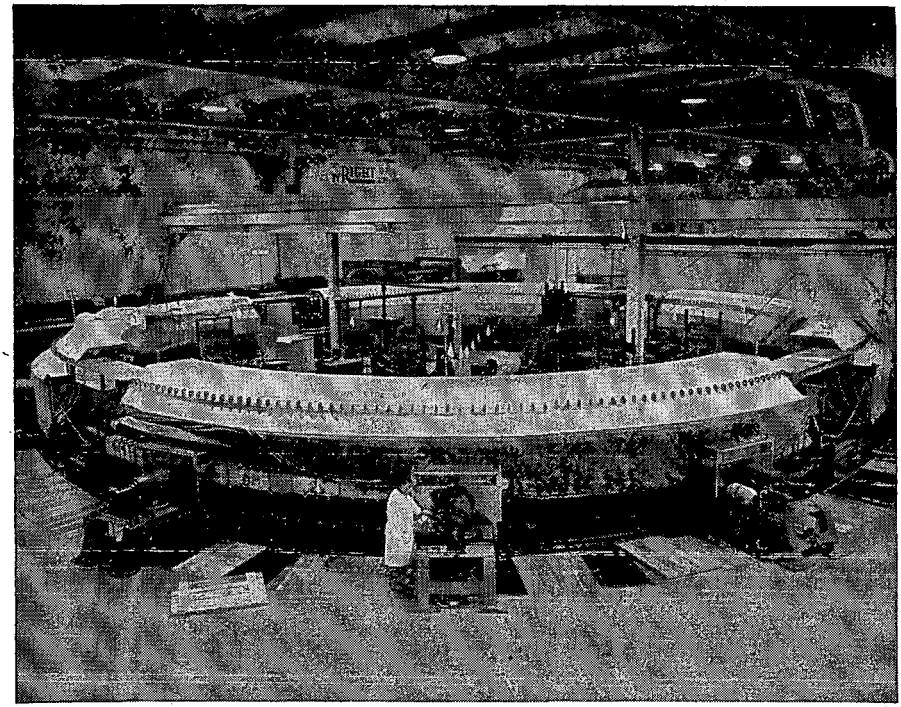

Fig. 6. The Cosmotron under construction. The magnet structure is practically complete here. It's sixty feet inside diameter, and weighs twenty-two hundred tons. The magnetizing current is supplied by a special motor-generator set; an eleven hundred horsepower motor drives a specially designed generator and a nine-foot, twenty-seven-ton flywheel. Massive electronic switching devices throw the cosmotron magnet load on the generator in one-second pulses; during that pulse, the generator delivers forty million watt surges of power, roughly fifty thousand horsepower peaks. The flywheel supplies the energy; the motor restores the flywheel's kinetic energy between pulses.

Where the covering tarpaulin is rolled back, a slot can be seen in the magnet structure. Each unit of the magnet structure is a C shaped mass of iron; the slot is the openings in the outward facing break in the C. The evacuated "race track" fits into these slots; the magnetic field between the top and bottom poles of the C's holds the protons in a curved path.

The whole circle of the magnet is broken into four slightly separated quadrants; in the separation breaks vacuum pumps, control equipment, the proton-injector, and the radio-frequency accelerating voltage equipment.

The Cosmotron operates as follows: Just barely visible above the farthest quadrant of the cosmotron itself is the square frame supporting the cylindrical tank of a van der Graff generator; this will inject protons into the cosmotron with a starting energy of four to five megavolts. The evacuated tube in the magnet C's will allow these megavolt protons to circle around the "race track." At the same moment the power of the special generator is thrown into the magnet coils. The energy of the generator will begin building up the magnetic field of the twenty-two hundred tons of iron. At the start of a pulse, the magnetic field is weak, and the protons have only five megavolt energy; "slow" protons in the "weak" magnetic field are deflected only slightly, and take an orbit of some sixty-five feet diameter.

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As the pulse of protons passes the break in the quadrants where the radio-frequency accelerator is, a pulse of electrical potential attracts them onward, giving a powerful kick that drives them onward at higher speed.

The magnetic field is increasing, however, and the faster-moving protons, in the strengthening magnetic field, now go around in an orbit tending to be larger because of their higher speed, but tending to be smaller because of the stronger magnetic field—and the resultant diameter is about sixty-five feet again.

The next time the pulse of protons passes the RF accelerator, it delivers another terrific kick; the protons go faster, the stronger magnet bends them more firmly—and the orbit remains sixty-five feet.

The protons make each successive turn around the track in less time, because of higher speed. At the start of a full cycle of operation, the RF accelerating voltage is applied about five hundred thousand times a second. But the voltage applied is frequency modulated—the frequency increases steadily with time during the one-second acceleration period. By the end of the acceleration period, the frequency has increased to something nearer five million cycles a second.

The overall effect is somewhat like a small boy getting the wheel of his bicycle spinning. At first, he gives long, relatively slow pushes. As the wheel gets going faster, he gives faster, shorter pushes, until he has reached his maximum.

Tuning up the cosmotron is undoubtedly going to be a terrifically delicate and complex business. The rate of increase of the speed of the protons must be such that their increasing tendency to widen their orbit will exactly match the increasing power of the magnet to bend them in a tighter orbit. The special generator's characteristics, the characteristics of the magnet iron, the way the windings are laid on, must all be matched perfectly by the rate at which the special frequency-modulated RF accelerator changes its frequency and power-of-push.

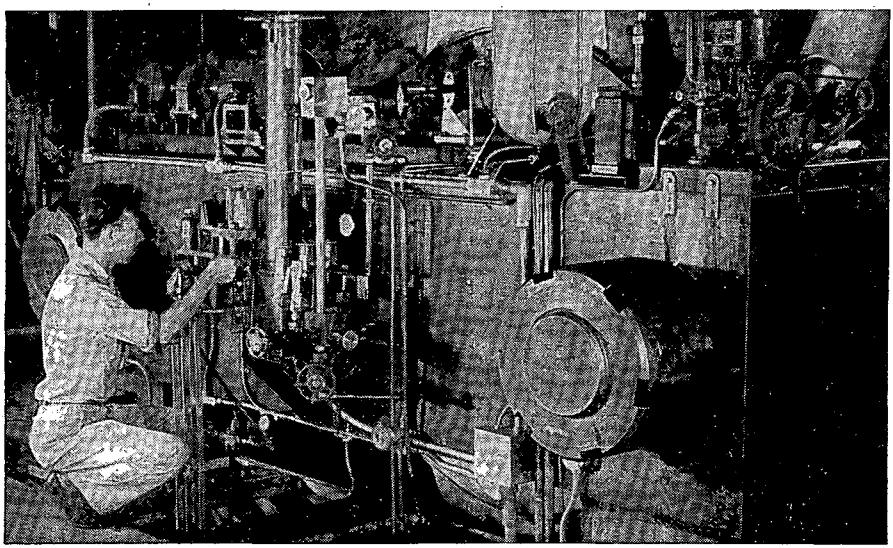

Fig. 7. Once upon a time, a Wilson Cloud Chamber was an inverted glass flask nearly full of India-ink stained water, and a rubber bulb to apply a bit of pressure to the trapped air in the flask. This is what a Cloud Chamber has developed into. A seventy-ton magnet, automatic pressure-pulsers, automatic camera equipment, and apparatus for applying up to three hundred atmospheres of pressure in the chamber. But with this, the results of extremely high-energy cosmic rays, and other extreme-energy particles can be studied.

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nuclear reactors, obviously. But it must also serve as a source of radioisotopes for investigation of the basic physics of radioisotopes as such. The isotopes must also be available for investigations of the applications of such materials. Radiation affects chemical reactions; the products of the reactor must be available for investigating that class of phenomenon, and the reactor itself must be used to investigate that class of chemical reactions under conditions of far higher radiation intensity than can be produced externally.

Every chemist is familiar with the Kipp Generator—the standard chemical laboratory gimmick, closely resembling the Silex type coffeemaker, which is used to produce a moderate supply of different gases for laboratory use. Frequently it's used for producing

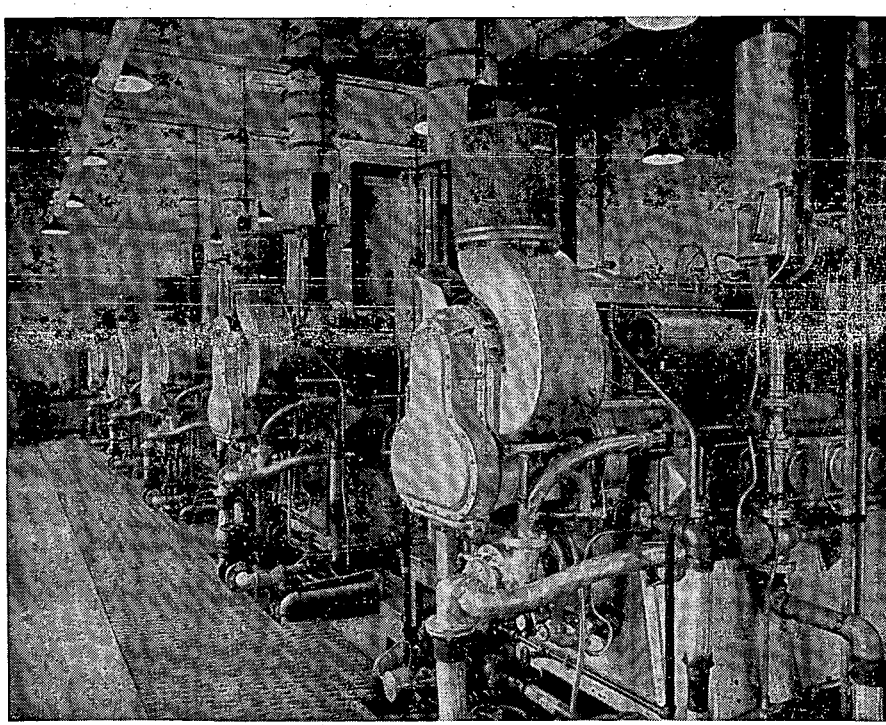

Fig. 8. Four of these war-surplus Diesel-electric mine-sweeper generator sets are required to supply power to the seventy-ton magnet of the Cloud Chamber. Basic Physics these days requires a huge investment to get a few photographic plates of individual atoms—and part of that investment is electric power in real, he-man quantities for even the seemingly minor equipments! The fifth generator set is a stand-by for use while any of the others is under servicing and maintenance work.

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hydrogen sulfide, or carbon dioxide, or hydrogen—a simple contraption with an upper and lower container, so arranged that a solid reactant in the bottom section is attacked by a liquid reactant from the upper container, the reaction producing a gas which prevents the entry of more of the liquid reactant until the gas is withdrawn.

A lot of chemical research was possible only because these basic reaction gases were available for study.

There are several basic gases in physics; as compressed air is useful to the chemist, so compressed electron gas has been invaluable to physics. It's somewhat harder to recognize that electricity is simply a flow of electron gas, through conducting "pipes," yet that, in essence, is a reasonable description.

Electron gas occurs everywhere; it need only be "compressed" or "pumped" to be detectable and useful. However, electron gas is effective only in investigating the outer shells of atoms; for investigating the inner shells, the nuclei, two other gases are essential: proton gas and neutron gas.

Proton gas is fairly readily obtained, but isn't reactive enough to be useful below a temperature approaching 1,000,000° C. This can be obtained by electrical acceleration of readily available protons. The cyclotron, van der Graff generator, et cetera, have been extremely useful in this work.

Neutron gas, however, is exceedingly difficult to obtain. The chemists had a horrible time obtaining fluorine to study, because the stuff was so violently reactive that it kept combining with the reaction vessels faster than it was produced by the reaction. Finally, Moisson succeeded in getting a sufficiently nonreactive vessel, and a sufficient energy source, to produce the free gas faster than it was absorbed.

But chemists had been trying to free fluorine for seventy-five years before he succeeded. Many chemists had lost their lives, or their health, because of the exceedingly toxic nature of the element—they had to work against fluorine's high reactivity and against the danger of its poisonous nature.

The physicists have met the same problem working with neutron gas. It is colossally reactive; it reacts with anything in the universe, with the sole exception of helium-4, to some extent. It is a fantastically poisonous substance; neutrons themselves are relatively harmless, but the combinations it forms with other substances makes neutron gas the most deadly stuff in the universe, bar none.

The only effective source of this immensely reactive—and hence immensely useful—reagent that has been discovered so far is the Nuclear Reactor. Like the Kipp Generator, a nuclear reactor is a source of an essential reagent gas—neutron gas. Thou-

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sands of reactions can be studied only with an adequate supply of this reagent. It's extremely difficult to produce, because the reaction materials must be fantastically pure, since the extremely reactive nature of the gas will allow the reaction vessel—the structure of the reactor itself—to absorb the product faster than it is formed if even a trace of some elements are present.

Much of Brookhaven's work now centers around the neutron gas generator—the atomic pile, or nuclear reactor. The process of producing neutron gas is necessarily the Number One project; better, cheaper, simpler sources are needed. But the neutron gas produced is making possible researches that were totally impossible without that reagent.

Nuclear physicists now, incidentally, are dividing into two general departments: the "nuclear chemists" who study the reactions and interactions of nuclei, and the "nuclear physicists" who specialize on the structure of the nuclei. The nuclear chemist finds the facts concerning how neutrons react with various isotopes; the nuclear physicist specializes more on the theory side—explaining *why* those reactions occur. The line of demarcation between them is, however, about as sharp as the outline of a gray ghost in a pea-soup fog.

One general center of work at Brookhaven is oriented around the nuclear reactor. There are several others, however, each relatively distinct, and each an extremely important aspect of basic physics. All, naturally, feed their data into the general pool of knowledge that is theoretical physics, and draw help from that general pool.

There is the Cosmotron center. The nuclear reactor is actually useful primarily, if not quite solely, as a source of neutron gas for nuclear reactions. It is immensely valuable for developing the already-explored field of nuclear reactions. But that area *has* been explored. Pathways of knowledge threading through the area already exist.

The Cosmotron is a particle accelerator that can drive outward into totally unexplored areas. That the areas are there, we know from work done on cosmic rays; the cosmotron is intended to produce particles approximating the energy levels of the lesser cosmic rays. No nuclear reaction so far produces energies over roughly two hundred million volts; cyclotrons have exceeded that energy concentration already. The problem is to get higher levels, and explore, under controlled, laboratory conditions—where "controlled" basically means "repeatably, so it can be demonstrated that X is present when, and only when, condition A obtains"—what happens at these higher energy concentrations.

The one billion volt energy level is

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a critical one; the $E = Mc^2$ law holds that any mass represents a certain concentration of energy. The hydrogen proton mass is such that it is equivalent to a little less than one billion volts.

When a quantum of energy equal to about one million volts strikes near the nuclei of an atom, the quantum frequently vanishes while an electron and a positron—with a mass-energy of about a half million volts apiece—appears. This electron-positron pair production is a common phenomenon.

The researchers are trying to see if they can produce a proton-antiproton pair in a similar general manner. One of the basic postulates of modern physics is that electric charge can neither be created nor destroyed—that the total of electric charge in the universe is constant and unalterable. It is, for instance, impossible so far as is known to produce a positron *or* an electron; only positrons *and* electrons can be produced in matched pairs.

Thus, if theory is correct, a proton cannot be produced; a one billion volt energy level should not produce anything new. No reaction should occur below two billion volts, and the probability of success at that threshold level would produce a very small yield. Something nearer three billion volts is expected to give positive results, however. Hence the Cosmotron; it is hoped that with it, protons and antiprotons, negatively charged protons, will be produced.

If they succeed, it will be the first successful reversal of the process of matter-mass being reduced to energy-mass; energy-mass will be converted to *stable* matter-mass.

Naturally, a multitude of other experiments are planned for the cosmotron, in addition to this basic one. Main use of the super-accelerator will be pure exploration, for several years to come. No one knows what will be discovered, beyond some strong hints.

Cosmic rays have long been the most powerful of all "tools" for investigating the nature of matter. We are, in a way, like the earliest semi-human ancestors of the race; they could not at the beginning, shape tools to their use. Their best tools were selected, naturally occurring formations of rock or wood. Their hammerstones were selected bits of flint; their clubs simply selected branches.

Later, men learned to shape flint to produce far better, more useful tools.

We're still using selection of naturally occurring atomic tools to a large extent. Cosmic rays still provide our most potent of all atomic can-openers. No theory, even, can suggest a method of achieving the ten thousand billion volt energies some of the cosmic rays evince. Some of the particles of the cosmic rays evidently are moving so close to the speed of light itself that our measurements of the speed of light have a larger margin of error!

The cosmotron is important in

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yielding predetermined particles; the cosmic-ray laboratories at Brookhaven are equally important, in making the best possible use of the most powerful of all investigative methods available—natural cosmic rays.

The particles from the cosmotron will have a pre-determined energy, because the researchers themselves put the energy in there. With cosmic rays, however, a different situation exists—we do NOT know the energy beforehand, but must measure the observed energy after the particle's arrival.

A major part of the cosmic-ray project will be measuring the energy of cosmic rays; the maximum energy of individual particles is, necessarily, indeterminate. From the earliest work with cosmic rays, the energy readings have simply been "Particle energies over—" so many millions, then billions, then quadrillions of volts. The upper limit in fact is unknown; our measurements can only name the minimum energy present, because the maximum energies remain too high to measure.

The basic measurement method is to trap a cosmic ray particle in a Wilson Cloud Chamber, when it strikes and explodes an atom of gas or solid in the chamber, and observe the degree of curvature of the path of the resultant debris in the magnetic field imposed on the chamber. This was the technique that led to the discovery of the positron, the various mesons, and to present estimates of particle energies.

The technique calls for a large chamber, and a huge, extremely powerful magnet. The bigger the chamber, the more chance that, in any given second, one atom in it will be struck by something super-potent. The stronger the magnet, the more the paths of the exceedingly high-speed debris will be curbed, and the more accurate the measurements of their energy can be.

The basic tools, then, are the reactor, the cosmotron—and its smaller cousins, the cyclotrons—and the cosmic ray division's cloud chamber and magnet, nuclear track photographic plates, balloons, and assorted equipment.

Each of these—particularly the reactor—has its own subdivisions, and service groups. The cosmotron is still a-building; the men who will work with it are now working on it; they are, as any basic physics researcher must be, handy with soldering iron, electrical engineering formulae, and expert mechanical engineers. (How heavy does the flooring under a three begavolt cosmotron have to be? What is the largest piece of magnet iron that can be shipped via available transportation routes to Brookhaven? If we decide we want a thirty-foot diameter disk of magnet steel, what shipment routes are available, and which routes will require least destruction and rebuilding of obstacles en

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route? Can a slab of steel weighing sixty tons be hauled through the Holland Tunnel without causing the steel tube, now semifloating in the mud under the river to sink through the mud? Or would the George Washington Bridge route be better? Or can we design something that doesn't need a single big slab? All these questions the physicist designing the equipment has to consider as well as the question of how to make any equipment at all that will do the required job.)

Then there are practical jobs of lawn-mowing, janitor service, and how high-level and FBI clearance the assistant janitor of the reactor building has to have.

Brookhaven has presented fancy headaches to a lot of perfectly ordinary businessmen, too. The contracting outfit that set up the building had some fine problems. The pile itself is insulated and shielded behind eighteen-inch thick plates of regular battleship armor. (It's one part of the installation that would be undamaged by anything short of a direct-contact hit by an atomic bomb!) There are four-foot walls of concrete. There are also offices, laboratories, and the like. The foundation immediately under that stupendously massive reactor structure was bound to settle under that concentrated tonnage; the foundations under the rest of the coherent building would not tend to settle as much. Problem: to design and build foundation footings in the sand-dune soil of Long Island that would *permit* a coherent building that would remain coherent.

The job of janitor and maintenance superintendent at the reactor building requires at least a master's degree in nuclear physics. How do you sweep up after a slight laboratory accident has spilled some exceedingly active chemical solutions that will make a Geiger counter *burp* like a machine gun at ten paces? The floors in the Hot Lab building are an interesting, if not aesthetically satisfying, checkerboard pattern of odd, and ill-matched paint, rubber tile, et cetera. Reason: various manufacturers claim to have developed floor coverings that will not allow radioactive solutions to penetrate. But will they actually perform? Brookhaven is finding out in the only practicable way.

Building Maintenance at the Hot Lab must include maintaining the automatic scaling counters that check the degree of radioactivity of the shoes of people who walk through or work in the labs. Health Physics actually has to take over part of building maintenance, and co-operate thoroughly with the construction maintenance staff.

Meanwhile, the Long Island Power & Light Company has one of the world's worst customers for electric power. The cosmotron, for instance, drinks quantities of power. And unlike an industrial load, it gets thrown on and off the power line in a completely

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erratic fashion. Research tools don't go into action on an eight-to-five basis; they are used when the associated equipment is set up, and for the length of time they are needed on that project.

The sort of load a power company loves is the kind that goes on with gradually increasing demand at about 8:00 to 9:00 p.m., building up to maximum about 11:00 p.m., and continuing at maximum until it slopes off gradually from about 6:00 a.m. to zero at about the time people in homes are getting breakfast. The load a power company loathes is the kind that comes on during peak power-demand hours only, and takes a tremendous slug of current when it does come on.

Power companies have to install equipment that can handle the heaviest load demand they will meet. If someone wants to install some equipment that he plans to use six minutes every Friday evening at 7:00 p.m., and will require five thousand horsepower when he uses it, the power company would have to install generator and transformer and power-line equipment to handle that five thousand horsepower demand, and will, at normal power rates, get twenty dollars a week for their trouble. Clearly, such loads are not going to be a help to a power company.

Brookhaven, therefore, represents one of the worst types of load a power company has to handle. Since it is not in a large industrial section, there is no great backlog of power-demand to make its load represent a small percentage of the local demand. The reactor is air-cooled, and the air is pumped by a battery of five blowers, each driven by a fifteen hundred horsepower electric motor. The reactor, naturally, does not operate continuously, or at a constant level. Neither do the blowers.

The cosmic-ray magnet doesn't operate continuously, or predictably, and it takes a lot of power. At that point the power company had to balk; handling that additional load would have meant installing power equipment they had no other need for, and so couldn't justify to the Public Utilities Commission.

Brookhaven installed a battery of war-surplus Diesel-electric generators, and generates their own power for the magnet. It's the cheapest, most economical way of handling the load.

Understandably, the Reactor leads to the largest group of sub-projects. Most of these stem from the radioactive fission products, and the biological work being done with radiation from these products, and from materials irradiated in the pile.

The neutron gas atmosphere within the pile can radioactivate most of the chemical elements; any organic compound can be rendered radioactive with the aid of neutron gas, since all contain carbon, and carbon-14 pro-

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duced in the reactor can be substituted for normal carbon-12.

One of the major projects is the effort to determine the possibilities of turning the #1 headache of the operation of a reactor into a #2 source of income. Brookhaven has an elaborate system of waste-disposal to take care of the exceedingly dangerous radioactive fission products; the fission products today constitute a pure hazard, and an unmitigated nuisance. The problem is to turn those now-dangerous radiations into useful products.

Separating the fission products from the uranium slugs is perfectly possible; recovering desired fission products would be engineeringly feasible, if there was a market for them. But setting up several hundred thousand dollars worth of processing machinery to secure experimental quantities of them is not practicable.

Instead, for research into what could be done if they were available, thin cobalt metal tubes are put in the pile, and heavily radiated. Neutrons are absorbed, forming radioactive cobalt. Thin-walled tubes are used, because cobalt absorbs neutrons so effectively that neutrons penetrate cobalt metal for only a fraction of an inch before being absorbed; it would therefore be impossible to completely irradiate a solid cobalt bar.

The thin-walled tubes, however, are made in nesting sizes; by assembling one inside another, radioactive sources of enormous power can be produced. One gram of radium decays at a rate which yields radiation rays at a rate designated as *one curie;* the radio-activated cobalt tubes disintegrate, yielding gamma radiation quite similar to that of radium, and sources can be built up, using multiple tubes, that have the radiation power of ten thousand grams of radium.

A one-curie source is more than needed for any therapeutic work; it will serve adequately for industrial radiographic work such as spotting flaws in heavy steel castings. But at Brookhaven and other AEC laboratories, men are calculating the possibilities and uses of sources measured in kilocuries and megacuries.

The cobalt sources are being used for the research on the possible uses of fission products, because they can be produced readily on a research basis; the ultimate aim is to develop a market for the fission products, and those fission products would be available in megacurie quantities. A ten kilocurie source is relatively a "pilot plant" model. Until the *use* of the materials has been proven in, there is no point in actually *producing* the materials; the nature of the products available is known, however, and the cobalt kilocurie sources serve as adequate equivalents.

The use of any product is determined both by inherent characteristics, and by economic characteristics; both must be investigated in this case. The present research is on the utility of

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the known characteristics; what can you do with a ten thousand curie source? With a one hundred kilocurie, or a one megacurie source?

Extremely high levels of radiation are lethal; a one hundred kilocurie source would make possible a sterilization process that could be used on such products as penicillin which cannot be sterilized by ordinary heating procedures. Penicillin is a complex, heat-sensitive compound—yet it must be sterilized, since it is used by injection directly into the bloodstream. Present methods are extremely effective—and also expensive. Radiation would make it possible to sterilize such medicinals *after* they were sealed in ampules.

For such work, even a high-cost radioactive product would pay off; the value-per-pound of medicinals is enormously high.

But at a lower economic level, and therefore broader demand level, are other products acutely sensitive to undesired changes under usual sterilization procedures. Canned ham, for example, cannot be sterilized feasibly at present, so that the canned hams are one of the very few canned products that must, nevertheless, be kept under refrigeration. Orange juice is another such product. Peas are canned successfully—but canned peas are regarded by most people as a pleasant vegetable, but a quite different vegetable from fresh peas. The flavor and texture are markedly changed. Sterilizing heat causes change.

Beyond the heat-sensitive sterilization business, there is a still broader, lower economic level—radiation as a source of chemical activation energy. Hydrogen and oxygen can be mixed without action at room temperature—but not if radiation is present! Gamma rays, by ionizing the gas atoms, would initiate the reaction.

Usually, chemical reactions are encouraged by application of heat; there are many, however, which might be possible with radiation energy that are not possible when simple heat is used as the activation energy source. Others that are unsatisfactory under heat might work nicely with adequate radiation excitation. Nitrogen and oxygen unite to form the economically desirable nitrogen oxides at the temperature of the electric arc—but the compound breaks down rapidly at lower temperatures—say around 2000°C. The process now used is to blow the gases through the arc producing instant heating, followed by instantaneous cooling. Radiation energy would "heat" the molecules so locally that a particular nitrogen atom might be ionized, react, and cool in the course of a half-dozen molecular collisions.

Plastics can be formed from compounds that will react only at temperatures so high the compounds normally disintegrate to a considerable extent. Say that A and B will polymerize at 450° C, but that A breaks down to C and D at 400° C at such a rate that the polymer formed of A

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and B is contaminated with thirty per cent C and D and unreacted B. Radiation energy can activate the polymerization without destructive heating in many cases.

The quantities of fission products needed for these various jobs varies from kilocurie amounts to hundreds of megacuries. If the fission products can be separated at a sufficiently low cost, there no longer would be a problem of radioactive waste disposal—instead there would be a lucrative market for the uranium atom-scrap.

Incidentally, Brookhaven will also radiate materials supplied by industrial research laboratories; the customer supplies the material, and the laboratory will place it in the reactor for exposure to the neutron gas. What particularly fascinated me about the business was the method of expressing the charges for the service; evidently the accounting department did not fix the system. To quote from Brookhaven's booklet concerning the irradiation charges:

"At the design power level of 30,000 kw the maximum flux (of neutrons) at the center position of the target conveyor will be about 4×10^{12} neutrons/cm^2/sec., while the extreme edge position will be about 1.2×10^{11} neutrons/cm^2/sec. Applicants may request any flux between these two values. The irradiation charge will be according to the following formula:

$$\text{Dollar Irradiation Charge} = \frac{(\textit{flux})\ (\textit{exposure time in days})}{4 \times 10^{11}}$$

I have a feeling that accountants will feel a certain vague discomfort at calculating costs on the basis of multiplying 2,000,000,000,000 × 30 and dividing by 400,000,000,000 to determine the cost in dollars. For one thing, I suspect standard bookkeeping machines aren't designed to handle thirteen to fifteen digit numbers.

Nuclear physics brings industry new problems!

THE END

THE ANALYTICAL LABORATORY

While scarcely of the type discussed above, still this Laboratory too has some meaning to us. We don't ordinarily rate articles, but Crispin Kim-Bradley's symbolic logic article called forth an unusually heavy response. Both interested readers, and also pleased specialists in Symbolic Logic and Mathematics commented very favorably. It's a genuine feat to discuss so difficult a subject enjoyably for readers, and still draw praise from fellow specialists!

FEBRUARY ISSUE

Place	*Story*	*Author*	*Points*
1.	Firewater	William Tenn	1.63
2.	Bridge	James Blish	2.42
3.	Steel Brother	Gordon R. Dickson	3.23
4.	Star-Linked	H. B. Fyfe	4.15
5.	Ev	Raymond Z. Gallun & Jerome Bixby	4.64

"Firewater," incidentally, got no vote for a place lower than third! THE EDITOR.

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HALF THE VICTORY

BY BRIAN PARKER

Once, *a soldier's armor, and the weapons for the field of battle determined the victor in war. But war's a different thing, and armor comes in strange guises now. The animals over millions of years tried bony armor, agility, frightful weapons—and lost to a different kind of defense!*

Illustrated by van Dongen

Biologist Edmund Foster was rapidly coming to a grave conclusion. The two men opposite Director Arthur Roblinson and him were the biggest imbeciles he'd ever met. He shifted his weight forward in the conference chair. His right hand brushed unconsciously along his jawbone where a small acid scar was blazing with color.

"Gentlemen, you don't seem to understand what I'm trying to tell you. The unit lab which I head is completely essential to the Civil Defense Department. Biological weapons will most certainly accompany the nuclear energy weapons. And we haven't got much time left. To divert my lab program now would be disastrous."

"Dr. Foster, you're letting your imagination run away with you," the CD Co-ordinator bleated. "Our plans recognize the possible use of biological weapons. The Military has explored the feasibility of such weapons. And we in Civil Defense have had the finds turned over to us. There is no cause for your alarm or laboratory program."

Foster closed his eyes and silently uttered a few choice words.

"I suppose the Military feels such weapons are not feasible?"

"Oh, but they are — for us. As we said, the Military studied the situation and they feel such weapons will be used in the event of hostilities. Are we right, Commander?"

Foster looked at the Second Dis-

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trict Commander. The Commander seemed to be considering other things.

"Oh, yes, quite. A decisive weapon in our hands."

"You see, Dr. Foster? We are in complete agreement with the Military on that point."

He heard Arthur groan beside him.

"Then why do you want to convert my lab to offensive uses? It will urgently be needed for defense."

"No, that's what we are trying to tell you. The electronic brain, the duplication of equipment, the excessive amount of personnel, and all the supplies in your laboratory are wasteful. It's not necessary."

Foster rubbed the wrinkles on his forehead.

"I've told you the brain is necessary to handle all the data. The equipment is duplicated so several samples can be analyzed simultaneously. Every man and woman in the lab is either a highly trained technician or specialist familiar with the equipment. And a stock pile is necessary so we have no lack of material. The lab must be sufficiently complete."

"But we have a fully trained medical corps and a public health department. They will be completely adequate for our purposes."

He shook his head. The Co-ordinator was mad.

"That would be suicide. The loss of human life would be staggering. Compared to the loss from bombing, the difference would be that between

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a forest fire and a burning match."

"Now, Dr. Foster, that's just your imagination. Our city covers over two hundred square miles. Our production plants cover only a small fraction of that area. The Military has informed us we'll probably be hit by four nuclear bombs. We assume the bombs will hit our production and transportation focus points. On that basis five per cent of our city will be destroyed and thirty-six per cent damaged. Radiation will be our biggest danger. We estimate casualties at eight per cent of the population. That's about equally divided between deaths and nonfatal injuries."

"And you're including casualties from biological weapons in that eight per cent?"

"Certainly. Any outbreak will quickly be brought under control. Our Public Health Department will see that adequate sanitation is maintained to prevent any spread of disease. And our medical corps will be able to handle any cases. They have all the necessary drugs and training. We have allowed a fraction of one per cent for such casualties."

He sank back into the chair and held his head in his hands for a few moments. Such reasoning was incredible.

"I'm telling you this city's casualties from biological weapons alone will be approximately thirty per cent. No, wait. I'm not through. That figure will only be possible provided my lab is operating. I don't like to think of what it would be otherwise. The public health department and the medical corps are incapable of handling it alone."

He noticed the Commander seemed slightly amused. The Co-ordinator appeared disgusted.

"Bacteria and viruses are not easily controlled—the viruses especially. Up to now sanitation and prompt medical attention have kept a shaky balance. But as I've pointed out, new and extremely virulent strains can now be produced. Kreber's theory of controlled mutation has successfully applied to both bacteria and viruses. I have myself developed for experimental uses deadly strains by that theory. And those strains were produced, studied, and destroyed in special sealed chambers. It would have been fatal for eight out of ten of us to have had direct contact with those strains."

"That's the main thing we want to discuss with you. Your work in that field was very enthusiastically received by the Military. We ourselves were greatly pleased with your reports when Director Roblinson handed them—"

Arthur interrupted bitterly, "Dr. Foster knows about your seizure of his reports from me."

The Co-ordinator squealed: "You had no right to withhold those reports. We must say it will be a black mark

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against you. But right now we are more concerned in advancing Dr. Foster's work. Dr. Foster, we want you to convert your laboratory and explore the offensive possibilities of your strains. The Military, of course, already has other laboratories doing such work. Still you are an authority in the work. We've assured the Military you'll have our fullest co-operation."

"You don't make sense. You tell me biological weapons are not dangerous and yet you want me to develop them for offensive use. Do you figure our strains will be more deadly than the enemy's?"

"Dr. Foster, you are confused by a simple fact. Our cities and people are civilized and have the full advantage of modern facilities. Our potential enemy is backwards compared to us. Surely you can see they would be hit harder than us by such weapons."

"That is a stupid conclusion. If you want to be fools, I can't stop you. I'm only interested in saving lives. I will not convert the lab nor will I allow any more of my reports to fall into your hands. The Director and I have agreed on a method to prevent that happening again."

The Co-ordinator went purple and sputtered, "You're an employee of Civil Defense. Our orders are to be carried out. This is outrageous."

The Commander woke up and agreed, "Yes, I want obedience in my command and I'm sure the Co-ordinator wishes the same in his department. You would do well to obey. After all an order must be followed to the letter or a serious situation will arise."

"There'll be a serious situation all right. The two of you, and I've never seen a pair of bigger jackasses, will have a dead city if you continue this harebrained plan of yours."

"You are," the Commander yawned, "fostering trouble for yourself."

Foster breathed deeply.

"Fortunately this is still a free country."

He pivoted from the table. The door threatened to come apart at the hinges as he pulled it open. He passed the two armed guards before they could snap to attention.

As he rounded a corner, he heard somebody hurrying behind him. Arthur fell in step with him.

"Ed, you can generate a lot of steam when you get mad. But I think you got out on a limb and sawed it off."

"Yes, I'm through. By next week I'll have an official set of walking papers. I've tried to think of a way to interfere with their plans. The lab is crucial to defense. So far I draw a blank. What do you have?"

"No ideas yet. The press will steer clear. Their readers are satisfied with the present setup. Bad news would certainly mean circulation drop. Everybody's too jumpy as it is waiting

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for the powder keg to spark."

"There must be a way."

"You could try getting somebody's attention at the capital, except for two reasons: One, you have to go through proper channels which include the two gentlemen we just left. Two, even if you could by-pass them can you imagine anybody listening to a little lab biologist who's being bounced for not following orders?"

"No, I suppose not."

He stepped into the elevator with Arthur. Arthur pressed a button for one of the floors higher up. He bent his knees to take the acceleration. He didn't like the slight sinking feeling in his stomach.

"It's a rotten deal, Ed. I've just finished getting your field technicians located. We're all ready and now the whole block pile is being toppled. Probably when they find out the extent of this operation, I'll be out on the street with you."

The elevator slowed to a stop.

"Arthur, it means those two will leave the city defenseless. And I don't like having my hands tied like this."

"Neither do I. Maybe we'll think of something. Going to stop by my office?"

"No, I'm going back to the lab. If I get a chance, I'll stop in tomorrow."

He pushed the surface button. As the elevator door closed, he waved to Arthur.

He nodded to the pilot and the helicopter lifted swiftly. He watched the squat one-story building blend into the surroundings of Center City. CD headquarters was built to take almost a direct bomb blast. If one man walked in there with his body harboring mutant viruses— He shuddered as he thought how quickly the rooms and halls would be guttered with dead and dying.

Minutes later the copter dropped him on the side of a hill. He entered one of the several small concrete structures dotting the hillside.

He stripped and placed his clothing in a locker. He dialed his identification and waited for the inner chamber door to open.

Inside he stuck a finger into an opening of the side wall while breathing into a small tube. He turned around and proceeded to coat himself with a thick lather from a dispenser. Finishing he pressed a button. Streams of various liquids sprayed his body. The honeycombed floor gurgled softly with suction. He moved two steps. Blasts of warm air dried him. He studied a set of dials. The analysis of his breath and blood was satisfactory. He wasn't bringing in anything dangerous.

He entered an elevator and quickly dropped to the main buildings. The chamber above began to hiss with live steam.

Dressed in his lab clothes, he walked down the center hallway. He entered the major control room.

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His two assistants were busy with a sample run. One was intently watching a teleview screen in front of a small control panel. The other turned from a more complicated control panel covering the entire left wall.

"Hi, Doc. You're just in time for lunch."

He smiled at the young man. Dick was seldom serious. Still Dick had built him one of the most advanced electronic brains to be had.

"Think you should eat, Dick? The girls might not like it if you get too fat."

A buzzer sounded and the other assistant rose and faced him.

"Well, Baldwin, what are the results?"

"Three runs were made on V-6-3941 this morning, Dr. Foster. The first took two hours—the second, six minutes. The total lapse time for the final run was three minutes seven seconds. That's close to the usual lapse time for the electronic brain to recognize a known analysis pattern."

He came close to chuckling at the look on Dick's face.

Dick muttered, "I don't know, I don't know. I've kept my crew adding units steady every month to keep up with all the facts, figures, and miscellaneous data you two keep shoving into the brain. And I get nothing but complaints every time the brain takes another second to solve some weird bug strain Doc develops. I think I'll need a nice long rest in a sanitorium before long."

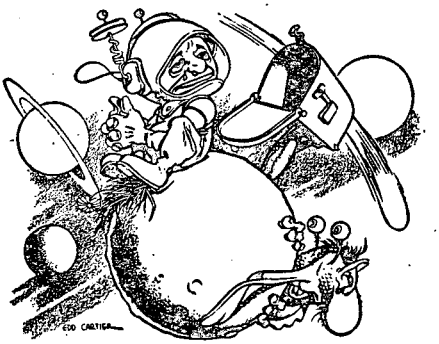
A voice from the right wall panel checked his comment. He was dimly aware of the blood draining from his face. He knew the three of them were rigidly still.

"Red alert, red alert. Rockets, thirty seconds. Target: Center. Target: Center."

He reached the panel and stabbed the master switch. Quickly he secured a phone set around his neck. Plugging the connection in, he tried to reach CD headquarters. Center was blanked out by static.

"The brain's on multiple analysis, Doc. What shall I do about power?"

"You'd better switch over now to



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our emergency power plant, Dick. The outside lines might fail and anyway the city will need the extra power."

He checked the panel. The entrances were all sealed off. The air supply was on triple cleansing. All he had to do now was wait."

"We should feel the earth tremors soon."

He felt the lab vibrate slightly as he spoke. One, two, three. He counted the major vibrations. Four, five, six, seven. The tremors stopped. He heard Dick gasp:

"Seven of them."

He tried the phone connection again. The static had cleared away. He had to repeat his request several times before the switchboard operator at headquarters calmed enough to understand him.

"Director Roblinson speaking."

"Arthur, it's Ed."

"Oh, Ed. We got it bad. Our static barrier and interceptors only got three of the big ones."

"Yes, yes, we felt the seven land. But what about—"

"They landed all over the city. We hardly stopped any of them. You're going to have your hands full when your technicians finish collecting their samples."

"Have you had any reports about them yet?"

"Yes. I see several of my men that were paired off with them are reporting in now. Just a minute and I'll find out."

He heard the babble of voices in the communications room although Arthur seemed to have a hand over the phone mouthpiece.

"Ed, a number of your technicians are already taking their samples to the pneumatic tubes. And, Ed . . . I think the Co-ordinator knows now what you were driving at. He's getting the reports on his office connection. My men aren't so fussy about wearing that face mask. The effect on personnel without them . . . well, we're starting to get reports of sudden deaths."

He left the panel and walked over to Baldwin's chair. The phone line trailed behind him.

The teleview screen showed one of his specially designed chambers. The automatic machinery in each was controlled by one of a number of technicians. Any type of manual testing could be duplicated by remote control. He had equipped the chambers with connecting tube links for the samples to be passed on after each successive breakdown into component parts. The chambers were isolated during analysis. Any break in the chamber walls would flood it with the powerful germicides in which it floated.

Baldwin said: "Here comes the first sample."

The small capsule popped into the chamber. He watched a mechanical

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hand start the preliminary analysis.

"You still on this phone connection, Ed?"

"Yes, Arthur, go ahead."

"The medical corps is yelling for help. The doctors are beginning to drop alongside their patients. The deaths are already beginning to mount. The Co-ordinator wants to know why your lab hasn't done anything yet. What a difference in tone from this morning."

He wished the Co-ordinator to other parts.

"The samples are beginning to stream in now, Arthur. We'll have results on some in a few minutes. What other troubles have you?"

"A few fires and a devil of a lot of drifting radiation. Nothing we can't handle. That is, could handle if the CD teams weren't collapsing in their tracks. If only that plant manufacturing those masks had increased its production, we could have equipped most of our trained personnel."

He walked over to Dick's control panel. Dick seemed satisfied the brain was working efficiently. He grabbed the carded solution as it dropped from a slot. Each field technician would be receiving the information on their sectors automatically. He placed the punched card over a decoder plate.

"Arthur."

"Listening."

"I just decoded the first solution. This one's quite a hellish mixture. The aerosol is composed of a strain each of bacteria and virus plus a body weakening poison. The poison's one of those causing trouble in the pulmonary system. The bacteria attacks smooth muscle and the virus prefers nerve tissue. They're both artificially immune to most of our antibiotic and chemotherapeutic agents. We can handle this one though."

"Nice friends we've got."

He took the cards as they came. Everyone differed although the general pattern was the same. The brain found a solution to everyone. The tightness in his chest eased.

"We've won this phase, Arthur. Two hours and every sample solved. What's the balance?"

"Twenty-nine per cent casualties in medical cases. That will probably rise slightly."

"How about our enemy?"

He repeated the question twice before Arthur answered.

"Ed, we threw back tenfold what we received. Center is the only station on the air. We heard one station after another quit while you were battling out there against time. For the past half hour we haven't been able to raise anybody anywhere. What's your answer?"

THE END

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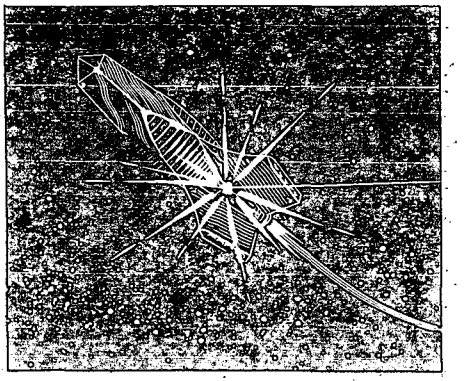

GUNNER CADE

Conclusion. *You can trap a man in patterns of behavior; you can make him believe life is too complex to understand. But if you force him out of the pattern, and he is a powerful, determined man—he'll smash that pattern!*

BY CYRIL JUDD

Illustrated by Pawelka

Synopsis

Throughout the Realm of Man—on Earth, Mars, Venus, and the few settled asteroids—Gunner Cade's name was known and his prowess admired. He was one of the youngest company-commanders in the Order of Armsmen, with a fabulous history of slaughtered enemies and victorious engagements behind him.

To Cade, however, the adoration of the Commoners was meaningless. He worked, and fought, only to fulfill the vows of poverty, chastity, and obedience he had taken in the Order. He lived decorously within the meaning of those vows, and meant to die fittingly, within the precepts of the Klin Philosophy. As a child he had learned loyalty to the Emperor and the Power Master. As a youthful Novice in the Denver Chapter House, he had learned devotion to the Gunner Supreme. And as Armiger, and later Gunner of the Order, he had sworn his fealty to the Star of France, the ruler of a large part of central Europe.

For Cade, life was a neatly solved puzzle, in which each perfect section had its perfect place. The ten-thousand-year history of the Order was the history of the Empire, was the history of man. Each morning, as he woke, he repeated to himself the mental ritual that prepared him for the day:

It is fitting that the Emperor rules.

It is fitting that the Armsmen serve the Emperor through the Power Mas-

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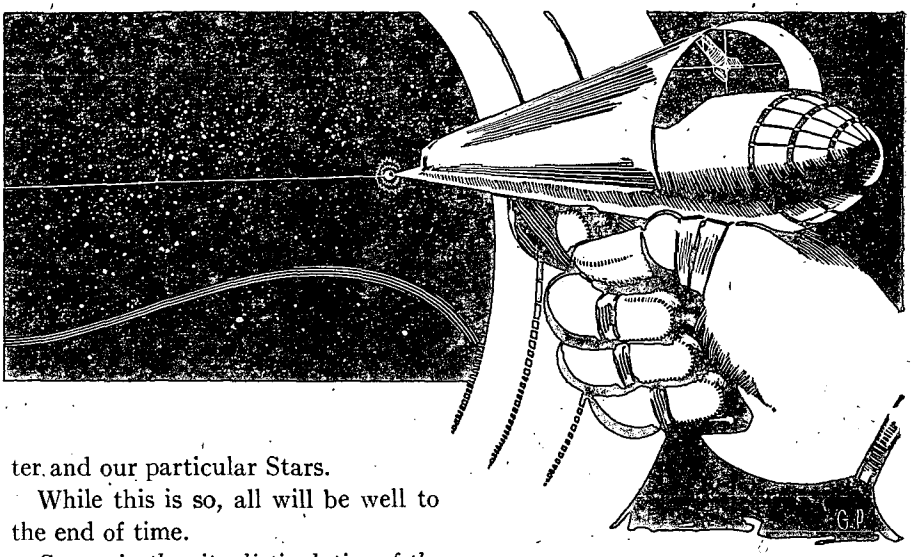

ter and our particular Stars.

While this is so, all will be well to the end of time.

Secure in the ritualistic duties of the Chapter House, Cade knew nothing of the storms that troubled the depths beneath the unruffled surface of the Realm. But after thirteen successful years in the Order, Gunner Cade made his first mistake—he let himself be trapped in the basement of a captured house during an action against the Star of Muscovy's Armsmen.

His captor, strangely, was not a Brother in the Order, but a withered old hag of a Commoner, whose obvious subservience and helplessness made it possible for her to give the invulnerable Gunner a drink of doped cider.

When Cade regained consciousness, he was in the underground rooms of a Mystery Cult, and, he shortly realized, in the hands of an unbelievable conspiracy against the Emperor himself. He managed one escape from the beautiful Commoner girl who guarded him, only to be recaptured, drugged, and hypnotized. Hours later, he was released in a bar in the red-light district of Aberdeen, the capitol city of the Realm. Through his mind a single posthypnotic command was powerfully repeated:

Go to the Palace and kill the Power Master.

All his training, all his instincts, all his loyalties rebelled. But his hands were ready, and his body was eager. Only the unexpected intercession of the girl he had first seen in the Mystery saved him. She appeared again in the bar, dressed as a prostitute of the District, and forced him to drink a fiery fluid that acted as an antidote to the hypnotic drug.

As his head cleared, Cade realized

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fully the importance of all that had occurred. He left the bar abruptly, determined to make his way to the local Chapter House and tell his story.

Ignoring the warnings of the girl, who would not leave him, he approached a City Watchman, demanding directions to the Chapter House. Not till he found himself being booked for disorderly behavior in the Watch House did he begin to understand the impossibility of obtaining an audience while dressed in the Commoner's clothes with which the Mystery had supplied him. But the immediate problems faded almost into insignificance as he began to understand something even more serious:

The incident in the captured cellar had occurred a full week ago—and the blaster-charged body of "Cade" had been found in the cellar. To the whole world, he was a dead man!

One night in a cage in the Watch House convinced him that his only hope was to appeal directly to the Order of Armsmen. Only there could his identity be established. In the early hours of the morning, with the assistance of an unbooked Klin Teacher, Fledwick Zisz, who shared his cage, he managed an escape. Together they stole a ground car, and made their way almost to the Chapter House, when they were stopped by a shocking and incredible order issued over the car radio:

"To all Watchmen and Armsmen" the voice said, "this command supersedes the previous all-Watch alert concerning the Cade-impostor and the unbooked Klin Teacher Fledwick Zisz. Both these men are heavily armed and both are dangerous. They are to be shot on sight!"

Now even direct appeal to the Order was impossible. Cade knew his Brothers too well: they would shoot as ordered. They would not wait for explanations.

There was one hope still. Gunners and Armigers would shoot, but the Gunner Supreme, the first Gunner of the Order, would listen. Cade was sure of it. Abandoning the stolen ground car, Cade and Fledwick set out on an overland march to the "Cave that is not a Cave," where Arle, the Gunner Supreme, lived.

The five days' trip taught Cade as much as thirteen years in the Order had —but very different things. He learned the language and the customs of the underworld fringes where Fledwick had grown up. He saw more of the ordinary life of the Realm than he had seen in all his life before. And he saw, too, the fearsome Caves of Washington, the caves where, it was rumored, fearsome monsters dwelled, and where even Brothers of the Order were forbidden to go.

A cleverly contrived attack on a sentry gained them entry, at the end of the march, to the mysterious Building of Fives where Arle lived—a building that was half cave, half house. Inside, Cade found even more to marvel at and puzzle over than outside. The Lady Moia, certainly, had no place in the home of the head of a chaste Order.

Cade might have accepted the Supreme's casual explanation of Moia, if

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he had not been awakened in the night by a cry for help, and from his window witnessed for himself the treacherous murder of Fledwick by two Brothers of the Order. When, minutes later, an assassin crept into his own sleeping chamber, Cade was prepared; once again, the charred corpse left behind was that of a substitute Gunner.

Cade made his way, alone, out of the dangers and confusions of the Building of Fives, his last hope now behind him. The things he had seen had shaken every belief of his life, but he had no new beliefs, no facts even, with which to start over. In all that had occurred, there was just one person who seemed to have been honest and helpful—the mysterious girl of the Mystery. And he knew only one place to look for her, without chancing recapture by the conspirators of the Mystery.

A chance brush with some dope smugglers enabled him to get transportation to Mistress Cannon's bar, where he had seen the girl for the second time. A handful of gawdies stolen from the apartment of the Lady Moia bought him room and refuge at Cannon's. Two weeks spent there taught him much, far more than he lad learned even from Fledwick. But at the end of the two weeks, he still had no clue to the whereabouts or identity of the strange girl.

By now, the Gunner had thought of one last hope. The Order had failed him, but there was always, forever, the Emperor himself—and the monthly Audience Days in which any citizen of the Realm could approach the Ruler personally. Cade left Mistress Cannon's disreputable place almost sadly, and went, in Commoner's clothing, to the Palace. There his inadequate knowledge of the customary graft lost him, at the last moment, his opportunity to pour out his story of treachery and conspiracy into the fears of the Emperor.

Removed from the Audience Hall by a Watchman, he babbled wildly of danger to the Emperor, and found himself, to his horror, being marched through Palace corridors to the Armsman on duty. It was sure death; the shoot-on-sight had never been rescinded. But for the first time in the long series of improbable difficulties, luck was with him. The Armsman of the Day was an old Brother in arms, and one sight was enough to convince Kendall that, Commoner's clothes or no, it was Cade and no impostor who stood before him.

On Cade's urgent request, Kendall took him to the private office of the Power Master. Here, Cade knew, his story would be heard and investigated. The Power Master was the Emperor's right hand, administrator, counsellor, and jurist. He would know how to punish treason and wipe out conspiracy.

The first act of the Power Master, when Cade's identity was established, was to shoot down Brother Kendall.

XV.

"Sit down, Cade," said the Power Master. He laid his gun on the polished

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table as Cade collapsed numbly into a capacious chair. Numbly he thought: it wasn't murder like Fledwick; Kendall is . . . was . . . a Gunner under arms. He could have drawn—but *why?*

"I can use you," said the Power Master. "I can always use a first-rate Armsman who's had a look below the surface and kept his head. You could be especially useful to me because, as far as the world knows, you are dead—now that Kendall had been silenced. Also you seem to have an unusual, useful immunity to hypnosis."

"You know about it," said Cade stupidly.

The Power Master grinned and said, rolling the words: "The Great Conspiracy. Yes; I have my representatives in the Great Conspiracy. I was alarmed when they advised me that a most able Gunner had been turned loose with a compulsion to take my life—and even more alarmed when I found you had slipped through the fingers of the fools of the City Watch."

The girl—*his* spy in the Mystery?

"Now," said the Power Master briskly, "tell me about your recovery from their hypnosis."

"I was left in a drinking room to come to my senses," Cade said slowly, uncertain of what to tell. If she was his spy—but he risked it. He might be shot down like Kendall, but he would know. "I felt the compulsion mounting," he said evenly, "and then it went away for no apparent reason. It has not returned. I left the place looking for the Chapter House to report. One of the women followed me, and we were both arrested by the Watch."

The Power Master looked up sharply, and Cade was certain that there was surprise in the glance. "You don't know who the woman was?"

"No," said Cade. That much, at least, was true.

"You're sure?"

"I've been trying to find out," he admitted, shamelessly, and the Power Master did not bother to repress a cynical smile. Cade didn't care—the girl was no spy of the Power Master's. His claim that the hypnotic compulsion had vanished by itself stood unchallenged. In spite of his bullying omniscience, the man did not know everything.

"Tell me the rest," said the Power Master. "What happened to your partner—the unbooked Teacher?"

Cade told him of their cross-country journey, the shattering discoveries at the Building of Fives that climaxed in the treacherous murder of Fledwick. The Power Master smiled again at the involuntary pain in Cade's voice as he mentioned the presence of the Lady Moia. And he nodded approvingly as Cade told him of his two weeks at Cannon's—"waiting for the hue-and-cry to die down"—and of his failure to reach the Emperor.

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"You've done well," he pronounced judiciously at last. "Now I want to know whether you've profited by it all.

"Since your novitiate, Cade, you've been filled full of brotherhood and misinformation. You've been doing all the right things, but for the wrong reasons. If you can learn the right reasons—Tell me first: why did you Gunners of France fight the Gunners of Muscovy?"

"Because they tried to seize an iron deposit belonging to our Star," Cade said simply. Where was the man leading?

"*There was no iron deposit.* One of my people faked a geological survey report for the Star of France and seeded a little Mars iron at the site. I held it in reserve as a bone of contention. When the French Star was making overtures to the Muscovite Star concerning a combination of forces, I let the news of the 'iron deposit' leak to Muscovy, with the results that you know. There will be no combination between France and Muscovy now, or for many years to come."

It was an elaborate joke, Cade decided—one in very bad taste.

"All your wars are like that," said the Power Master, grimly. "They are useful things to keep the Stars diverted and divided. That is the purpose of the Great Conspiracy as well. It requires immense funds to keep an underground organization going; the half-dozen or so Stars now supporting the Cairo Mystery conspiracy will soon be bled white and drop off while others take their place. My agents will keep anything serious from ever coming of the Cairo affair, of course."

This was no joke, Cade numbly realized. It was the end of his world. "What do the Stars behind the conspiracy want?" he asked, fighting for calm.

"They want to kill me, of course, and go their own wild way. They want more, and more, and more Armsmen. They want to fight bigger and bigger wars, and destroy more and more villages. You've been taught that the Stars are loyal to the Realm, the way Commoners are loyal to the Stars. The truth is that the Stars are the worst enemy the Realm has. Without a Power Master to keep them out of harm they'd have the Realm a wreck in one man's lifetime.

"And your precious Gunner Supreme. Cade, I suppose you think he's the first one like that in ten thousand years and will be the last one like that until the end of time?"

"That was my hope," Cade said almost wearily.

"Disabuse yourself. Most of them have been like that; most of them *will* be. Arle is plotting, if you please, to supplant me, merging the two offices. It is only to be expected. A Gunner such as yourself may survive years of combat because he has brains.

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He becomes a Gunner Superior, in intimate contact with a Star. He figures in the Star's plottings. The women of the Court, fascinated by the novelty of a man they can't have, bend every effort to seducing him and usually succeed. His vows are broken, he misses the active life of battle, he intrigues for election to the office of the Supreme. By the time he wins it he is a very ordinary voluptuary with a taste for power, like our friend Arle.

"But Cade, this is the key; don't forget it: *there must be a Gunner Supreme.* As a fighting man you know that. Many a time the fact that the Supreme lived somewhere and embodied your notion of the Order has saved your life or saved the day for your command. The fact that the Supreme in the flesh is not what you think doesn't matter at all."

Cade leaned forward. The abominable thing he was about to say was a ball in his throat, choking him so he had to get rid of it: "The Emperor?" he asked. "The Emperor? Why does he allow it? Why?"

The Power Master said calmly: "The Emperor is another lie. The Emperor can't stop it. He's just a man—an ordinary one. If he attempted to make suggestions about my task of running the Realm, I would very properly ignore them. Cade, Emperors who have offered too many such suggestions in the past have died young. Their Power Masters killed them. It can happen again if an Emperor meddles.

"And that's as it should be. As you know, the line of the Power Master descends by adoption and the line of the Emperor by male primogeniture. The Power Master chooses a tried man. The Emperor gets what chance sends him. Of course the line of the Power Master is stronger, so of course it must rule."

His voice rose almost to a roar. "*But there must be an Emperor.* The Power Master is unloved; he sends people to death; he collects taxes; he sets speed limits. The Emperor does none of this; he simply exists and is loved because everybody is told to love him. People do it—again, the right thing for the wrong reason. If they didn't love him, what would happen to the Realm? Think of such a thing as all the Commoners becoming criminals. What would we do when the Watch Houses were all filled? What would we do if they kept attacking the Watch Houses until all the gas-gun charges were used up? But they don't all become criminals. They love the Emperor and don't want to sadden him with unfit deeds."

The Power Master rose, holstering his gun, and began to pace the room restlessly. "I am asking you to think, Cade," he said with blazing intensity. "I don't want to throw away a fine tool like you. I am asking you to think. Things are not what they seem, not what you thought they were.

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"For many years you did your best work because you didn't know the right reasons. Now it's different. There are other jobs for you, and you won't be able to do them if you're blinded by the lies you used to believe. Remember always that the Realm as it is *works*. It's been kept working for ten thousand years by things being as they are and not as they seem. It can be kept working to the end of time as long as there are resolute men to shove the structure back into balance when it shows signs of toppling."

Stopping for a moment at the feet of the slain Gunner Kendall, he said simply: "That was for the happiness of millions. They are happy, almost all of them. Gunners are contented, the Kiln Service is contented, the Courts are contented, the Commoners are contented. Let things change, let the structure crash and where would they be? Give each Commoner the power I hold and what would he make of it? Would he be contented or would he run amuck?

"Cade, I don't want to—lose you. Think straight. Is there anything really unfit about the work I do, the work I want you to do for me? You made a trade of killing because the trade was called the Order of Armsmen. My trade is conserving the stability and contentment of every subject of the Realm of Man."

The passionately sincere voice pounded on, battering at Cade's will. The Power Master spoke of the vows Cade had taken, and he destroyed their logic completely. Cade had dedicated himself to the service of the Emperor—the powerless, ceremonial excuse for the Power Master. With ruthless obscenity of detail he told Cade what he had given up in life in exchange for a sterile athleticism.

He spoke of food and drunkenness and drugs, dancing and music, the whole sensual world Cade had thought well lost. He wooed the Gunner with two intertwining siren songs—the fitness of his new service under the Power Master and the indulgence of himself that was possible in it.

It would have been easy to tumble into the trap. Cade had been drained empty of the certainties of a lifetime. The Power Master said there was only one other set of certainties, and that if Cade would only let himself be filled with them there would be the most wonderful consequences any powerful man of normal appetites would want.

It was easy to listen, it would have been easy to accept, but—Cade knew there was more even than he had been told. There was one thing that did not fit in the new world, and it was the girl. The girl who had not wanted the Power Master killed, or the Gunner either. The girl who had warned Cade rightly that he would be going to his death if he tried to reaffiliate with the Order. There was no all-powerful, all-loving Emperor any more; there were no loyal Stars; there

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was only the Power Master—and the girl.

So, thought Cade, treachery is the order of the day and has been for ten thousand years. He knew what answer he would give the Power Master, the answer he had to give to stay alive, but he was not ready to give it yet. A lifetime of training in strategy made him sharply aware that a quick surrender would be wrong.

"I must have some time, sir," he said painfully. "You realize that it's new to me. My vows have been part of me for many years, and it's less than a month since I . . . died . . . in battle. May I have leave to spend a day in meditation?"

The Power Master's lips quirked with inner amusement. "One day? You may have it, and welcome. And you may spend it in my own apartment. I have a room you should find comfortable."

XVI.

The room was comfortable by any standards Cade had known; it was second in luxury only to the smothering softness of the Lady Moia's apartment. Compared to Mistress Cannon's mean quarters, or the sleeping lofts of a Chapter House, it offered every comfort a man could ask. And the room also made unmistakably clear what lay behind the Power Master's speech. It was, almost openly, a prison.

There were no bars to guard the windows and presumably the "shoot-on-sight" order had lost its force. Yet Cade was certain he could not leave the place alive without the express permission of its master. If there had been any doubt about his answer tomorrow, the room would have resolved it.

And it went deeper. If he'd had any tendency to give that answer in good faith, or any hesitation at the thought of falsely declaring his allegiance, the room dispelled it. Given freedom, he might have found it hard to return and commit himself to treachery and deceit with a lying promise to the Power Master. As a prisoner he owed no honesty to any one but himself. And perhaps to the girl—if he could find her.

The Gunner slept well that night. After breakfast had been brought him his host appeared.

Cade did not wait to be asked. Saluting, he said: "My decision is made; it was not a hard one. I am in your service. What is my first assignment?"

The Power Master smiled. "One that has been waiting for you. The Realm is threatened—has been threatened increasingly—by the unbounded egotism and shortsightedness of one Star against whom I cannot operate in the usual way. Until now . . . until now I have been searching for a man who could do what was necessary. You are the man."

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He paused, and the silence in the room was explosive.

"You will go to Mars," he said finally, "and arrange for the death of the Star of Mars. You will return alive. The details are your own concern. I can supply you with a flier and with money—whether to buy men or machines I do not care."

Cade's mind accepted the job as a tactical problem, putting off for the time being the vital decision as to whether the commission would be fulfilled. For now, it would be necessary to act as though it would be.

"I will need an identity."

"Choose it. I said the details were your own concern. I can offer, merely as a suggestion, that you would do well to adopt the identity of a lapsed Armiger—you have known such cases—who took to the district. You might as well put the time you spent in that place to some use. And I can assure you that under such an identity you'll find yourself welcome in the Court of Mars. Yes," he said in answer to Cade's look of shocked inquiry, "things are that bad. Did you suppose I'd send you to kill a Star for anything less serious? Now, when you've decided on your course of action and prepared a list of your needs, call me." He indicated a red button on the wall communicator, "Either I or a trusted servant will be there."

As he pointed, the set chimed. The Power Master depressed the button.

"Here."

"Message, sir. Shall I bring it?"

"To the outer room." And to Cade: "Call when you're ready."

The Gunner lost no time. He was already listing the funds, transport and identification he would need when the door opened abruptly again. Again it was the Power Master.

"You are going to have a visitor," he said coldly. "I am very interested in knowing just how she discovered—"

"She? *Who?*" Cade was on his feet, the list forgotten.

"Whom do you suppose? How many Starborne ladies do you know?"

It was the Lady Moia, then. And the memory of her still hurt. It would take time to recover from the shocks of that night. "One, sir, as I told you," he said formally. "And I would prefer not to see her if that is possible."

"It is not possible. She knows you are here and I have no grounds for refusing her admission without revealing your identity. *How did she know you were here?*" the vibrant voice demanded.

"Sir, I don't know. I haven't seen her since the Building of Fives—"

"The Building of Fives? You spoke only of the Lady Moia there." He peered closely into Cade's puzzled face and suddenly burst into a wide, wolfish grin. "You *don't* know!" he exploded. "My virtuous Gunner, this

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is the girl for whom you waited two weeks at Cannon's—I had a report from there last night, an hour after you went to sleep—a mysterious girl, a girl whom you had met just once." He was dragging it out, enjoying himself hugely. "Oh, Cade, you were so *upright* yesterday; so true to your vows. How could you have . . . neglected . . . a little thing like telling your master about the girl?"

Cade felt the blood rush to his face, but it was not the reflex of shame. It was she; she had found him after his futile, stupid hunt for her. And she was no Commoner or wearer of the garter but a Lady of the Court!

"No," laughed the Power Master. "I won't spoil the joke. You'll learn who she is shortly from her own . . . shall I say, delicate? . . . lips." The facade of grimness relaxed; the Power Master sat comfortably on the couch, chuckling. "If it's any satisfaction to you, Cade, I will admit that my respect for you, my hopes for you, have risen. I can use a man who knows when to keep his mouth shut. So she Saw Life after all?" His intonation was heavily satirical, amused. "Proof again that the simplest answer may sometimes be right. The whole Palace has been buzzing about it for three weeks, and I thought I knew better!"

Cade tried to concentrate on what he was hearing and make sense of it. "The whole Palace?" he asked uncertainly. "You mean you knew about her? The whole Palace knew?" Then why, he wondered, all the secrecy now? Why was he a prisoner here? None of it fitted with the Power Master's attitude of yesterday.

"Yes, of course. But *they* all thought it was the daring impostor—Cade she met—and only I knew it was the real Gunner, chaste and pure—or so I thought. Now it seems I had the right information, but they have the right interpretation of it all. And to think of the horror on your face yesterday when I talked of these wicked matters! Cade, you impress me; you'll be a good man, to have in my service." He broke out chuckling again. "What did she look like? She's so . . . *you* know."

"So beautiful?" asked Cade.

The Power Master stared at him wonderingly. "We'd better get you off to Mars," he said. He unfolded a note and read it through. "She says she recognized you yesterday in Court but didn't want to 'betray you.' Now that I've 'captured' you she wants to see you before you die."

Abruptly he ceased to be a man enjoying himself. "Cade," he said grimly, "I can understand and excuse your lie by omission of yesterday *if* it was prompted by loyalty to your Lady. But if I find there's anything more to it, your little friend's visit will be, quite literally, the last you will enjoy before you die."

The door closed behind him and Cade sank into a chair, burying his face in his hands. Had he gone mad?

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Had everybody?

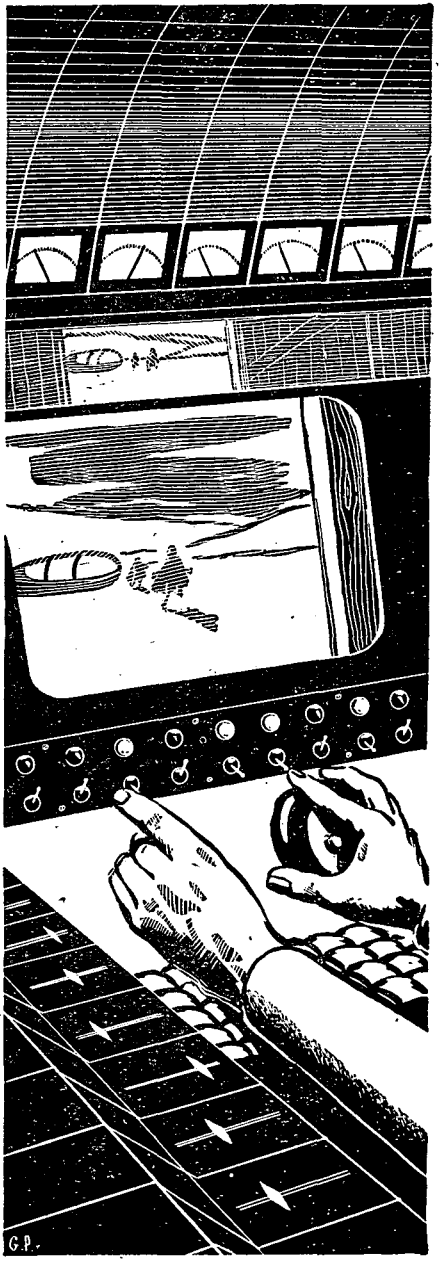
"Traitor, face me! They said you lied and I did not believe them, but I know now. Look me in the eye if you dare!"

Cade jumped up. He hadn't heard the door open; the first thing to reach his ears was the unpleasant whine of her voice, contrasting ludicrously with the melodramatic words. He looked at her, heartsick as he realized the monstrous joke somebody was perpetrating. It was the Lady Jocelyn. He had noticed the resemblance yesterday—*but who knew about it except him?*

"Traitor," she said, "*look on my face* and see how you erred when you thought to victimize a foolish and ignorant Commoner girl. *Look on my face.*"

He looked, and something impossible was happening. The Lady Jocelyn's squint-stooped head moved back to sit proudly on her slim throat. Her round-shouldered stance straightened for a moment and settled to a supple, erect figure. The nearsighted, peering eyes flashed with humor and arrogance. She still wore an ill-fitting robe of lurid orange and her stringy hair still missed matching the color of her robe, but none of these things mattered. It was *she.*

"Have you nothing to say for yourself in your shame?" she demanded, in a voice that was also a caricature.



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"A thousand pardons, Lady," he said hoarsely, his heart thudding. "If I had known, if you had permitted some word of your rank to cross your lips I could not have lied to you." *If Fledwick could hear me now!* The girl winked and nodded "go on."

"Surely your warm heart will understand and forgive when I say that only your beauty drove me to my crime." The story seemed to be that the Lady Jocelyn, the Palace butt, had gone out on the town incognito and been arrested, to the hilarity of the Palace wits. She was pretending to assume that he was under death sentence for daring to insult her by taking her at her face value.

"Forgive?" she declaimed. "Forgive? Justice will be done; there is nothing to forgive. A life for an insult to the blood imperial. I have come to console you, fellow. Bring a chair for me and seat yourself."

Cade did as he was told, by now far beyond any effort to take control of the situation. He knelt at her feet as she sat down and pulled a sheaf of manuscript from a sagging pocket in her voluminous robe.

"I shall console you for an hour by reading from my works." She launched into what he supposed was a poem:

"There is no whisper uttered in the Realm
That goes unheard. By night, by day, no voice
Is raised involuntarily or by choice
Unheard by him who holds the Palace helm."

She cleared her throat and Cade nodded, jerking his head a little at the wall communicator. He understood.

"The doors are many in the Realm of Man;
This door unguarded, that door triply sealed;
Each loyal subject wearing like a shield
The key: to live as fitly as he can."

Her knee pressed sharply against Cade's shoulder during the three words "this door unguarded." He managed to concentrate on the message.

"Starborne or common, we must take and use
The lives that we are handed for our lot.
Great Klin can tell us what to do or not;
Not now or ever is it ours to choose."

The words were *take and use—now.*

She rattled her sheaf of manuscript, and from its bulky folds a flat case slid; he caught it before it struck the floor. *Take and use—now.* It was the smallest size of 'caster. He had it open in an instant and saw a half-hour reel of recorded tape ready to roll. All dials were at zero.

"My voice is small; I do not know the way
To reach all of the willing hands that serve,
Setting at ease the flesh and bone and nerve.
But if I spoke like thunder, I

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would say:

Good people, follow Klin by night and day."

My voice—I do not know—setting. Swiftly he mixed bass and treble volumes to match her voice—and hoped the spy-mike on them and its system were anything but high-fidelity. He started the tape on a quick nod from the girl and was relieved to find that he'd done well. In a very fair approximation of her adenoidal whine the 'caster immediately began to drone out:

"What beauty lies in loyalty! What joy!

Is there a heart that throbs with lesser thrill—"

He placed the box carefully on her chair as she rose and followed her silently from the room. The Power Master, on the other end of the spy-mike, was welcome to his share of the Lady Jocelyn's verses.

XVII.

She led Cade through endless, twisting dark passageways and stairs. Doors opened at a touch from her hand where no doors seemed to be, and never once did they encounter another person in their flight. There was more to the Palace than met the eye, Cade realized.

When they emerged at last it was into a narrow alley like those of the district where Cade had spent two weeks. Cade was sure it was not one only because they had not walked long enough. A ground car whisked them away from the alley door. Cade never saw who was driving. He followed the girl into the back seat and turned to her promptly with the thanks and questions uppermost in his mind, but she put one finger to her crookedly-painted mouth and shook her head.

Cade sat back, forcing his body to relax, but his mind was busy, fascinated by the puzzle of her constantly-shifting personality. She had been a Commoner at their first meeting, but one with an air of command, an important person in the Cairo Mystery. Then she had been a wearer of the garter, openly seductive—and vulgar. And now a Lady of the Court, a niece of the Emperor himself!

He knew now that the first time she had been a spy; he did not know for whom.

The second time she was in masquerade. The Palace thought it was on holiday—he knew it was not.

This time he could not doubt her true identity; but the awkward, graceless, shambling fool of the Audience Hall was not the same Lady Jocelyn who sat beside him now, erect and confident.

All he had learned so far was what she was not—except two things: that she was still, and always, even under the makeup of her Palace role, exquisitely beautiful, and that she had rescued him again—for what?

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The car braked to a violent stop on the edge of a field, and the Lady gestured him to open the door. She led him briskly across the field to an ancient, unpainted structure; Cade had no chance to look at the vanishing car.

"Open it," she said, at the door of the building.

Cade heaved a wooden bar out of double sockets and pushed the double door open. There was a space flier inside—twelve meters of polished alloy.

"You can fly this, Gunner." It was a statement, not a question.

"I've taken fliers to the Moon and back," he said.

She looked worried. "Not Mars?"

"I can take it to Mars," he said—and he or any Gunner could.

"I hope so. This flier is loaded and fueled, with food aboard." She pressed a folded paper into his hands. "These are the co-ordinates of your landing-point on Mars. There will be friends waiting there, or they will arrive shortly after your landing. If you take off immediately, you will probably be out of radar range before they can pursue."

"They?" he demanded. "The Power Master's fliers?" As far as he knew, the Power Master disposed only of freighters and ferries, without a ram in his space fleet.

"Cade," she said steadily, "we have no time. I've helped you before, against your will. Now I ask you to take off immediately—without questions or argument. First you must strike me—knock me unconscious."

"*What?*"

"You've done it before," she said angrily. "I must have a cover story to delay them with while you get clear."

Cade looked down at her, at the brilliant eyes and lovely face beneath the grotesque makeup. It was strangely pleasant, this warmth he felt—strangely unlike the peril he had been taught to expect from such nearness to a woman. It felt much as the touch of the Gunner Supreme's seal to his lips had felt in another life. Even as the thought came his lips tingled.

"Cade!" she said furiously. "I tell you, there's no time to waste. The tape gave us a half-hour at the most, even if they didn't get suspicious before then. Do as I say!"

A Palace ground car roared down the highway across the field, braked screechingly and began to back up.

"They're here," she said bitterly.

Cade struck her as she said he must—but he did not leave her lying there to cover his escape. He picked her up and raced into the building and up the ramp to the control compartment lock standing open and waiting. He buckled her limp body into an acceleration couch as a yelled challenge to surrender echoed in the building and clanged the lock shut.

He slipped into the pilot's seat and

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reflex took over. Straps, buckles, neck brace, grid one temperature and voltage, grid two temperature and voltage, first stage discharge buildup and fire.

His blackout lasted only a few seconds. He turned in his straps, craning his neck to see the couch. She was still unconscious. Indicators flashed on the panel and his hands worked efficiently, as if with a life of their own even though he had not flown out of atmosphere for three years. For ten minutes he was necessarily a part of the ship, his nerve system joined with its circuits by his dancing fingers on the controls. Last of all he cut in the flier's radars and unbuckled himself.

He kicked himself over to the couch, frightened, to feel the girl's neck. She shouldn't be out that long, he worried. But she was and there was nothing he could do about it.

Distractedly he began to search the ship for medical equipment. He braced himself in toe-holds and spun open the aft port of the control compartment and floated into a cargo room perhaps three meters deep. In there, except for the space filled by an oversized loading lock, the bulkheads were lined with locked cabinets. Floating free in the compartment were four sealed crates. It was cargo, not medicine, here.

Aft of the cargo compartment was a bunk-lined cabin with a tiny galley and a vapor cabinet—the living quarters. She would want water. He filled a valved bag from the tap and gummed it to his thigh with a scoop of paste from one of the omnipresent pots. When he kicked his way back into the control compartment the girl had freed herself from the couch and was swaying against a bulkhead with an uncertain hold on a grabiron.

"You fool," she said in a deadly voice.

"You told me to take the ship to Mars," he said flatly. "That's what I'm doing."

"Give me that water," she said, and drank inexpertly from the valve. "Cade," she said at last, "I suppose you meant well but this means death for us both. Did you suppose they'd let you chase off into space with a member of the Emperor's family on board? They'll destroy us and I will be reported killed—unfortunately—in the action. If you'd listened to me, I could have given you time for a safe escape."

Cade pointed to the stern-chase radar. "Look," he said. "There's nothing in sight—one pip."

"*Where*?" She pushed off from the grabiron and landed, clutching, by the screen.

"See?" he showed her. "A meteorite, most likely. Or even another ship. But not after us. They couldn't get into the air in less than two hours. Not unless they have fliers fueled and ready to go. By then we'll—"

"Suppose they have?" she blazed. "Wasn't *this* ship ready to go? Have

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you learned nothing? Do you still think the Realm's what it seems to be? This ship has been waiting six years for a Gunner to fly it and now it's to be destroyed because of your folly!"

Cade floated before the screen, watching the green point on the gray ground. It was just becoming recognizable as three bunched points. Each second that passed made them more distinct. "Fliers," he said. "What are they—cargoes, ferries, recons, rams?"

"I don't know," she said venomously. "I'm no Gunner. Rams, most likely."

"With you on board?" Rams were designed for annihilative action. They matched velocities with their quarry and crushed it with their armored prows. It meant death to all aboard the victim.

"I see you're still living in your ethical dream-world," she said. "I'm just a good excuse for the attack, Cade. If only you'd listened to me—What are you going to do now?"

"Outrun them if I can." He floated into his seat again. "I can try an evasive course and accelerate all the ship will take." It wouldn't be enough, and he knew it. "If the other pilots are inferior—"

"They won't be!" she snapped. He wondered whether she knew that rams had relays of pilots, always fresh, always solving for the difference while the quarry took evasive action, always waiting for the moment when the victim's single pilot tired after hours of dodging and began to repeat his tactics.

He reset the stern radar for maximum magnification and got a silhouette of three ugly fliers, smaller than his own, with anvillike beaks. They were rams.

"Cade, listen to me." Her voice compelled attention. It was more than a tone of command, more than the urgency of the words. It carried a desperate seriousness that made him pause.

"I'm listening."

"You'll have to fight them, Cade. There's no other way."

He looked at her unbelievingly.

"There are guns aboard," she said, not meeting his eye.

"*What are you talking about?*"

"You know what." She looked squarely at him, without shame. "Fire on them!" she said.

XVIII.

It had been a rotten thing to hear from the lips of the lax and dissolute Mars-born Gunner who had died in France. To hear *her* speak the unspeakable tore his heart.

"It's for our lives, Cade!" she pleaded, shamelessly.

"Our lives!" he was passionately scornful. "What kind of lives would they be with a memory like that?"

"For the Realm of Man, then!

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The mission we are on!"

"What mission?" He laughed bitterly. "For a lie, a farce, a bad joke on the lips of the Power Master? What is the Realm of Man to me? A weakling Emperor, a murderous Power Master, a liar as Gunner Supreme! I have nothing left, Lady, except determination not to soil myself."

"Jetters and bombles!" she exploded, pleading no longer. "That's the way you're thinking—precisely like a Commoner's brat terrified of the Beetu-five and the Beefai-voh!"

"I have no fear of the Beefai-voh and I don't believe in bombles," he said coldly. "I believe there are things one knows are wrong, detestably wrong, and I refuse to do them. I wish . . . I wish you hadn't said it."

She was fighting for calm. "I see I'll have to tell you some things. I won't try to pledge you to secrecy; your promise would be meaningless. But I hope that if the time comes, you'll let them torture you to death without revealing what I say, or that it was I who said it."

He kept silence.

"You've never heard the word 'history,' Cade."

He looked up in surprise. He had —used by the mad little burglar who'd been beaten to death in the Watch House.

She went on, frowning with concentration: "History is the true story of changes in man's social organization over periods of time."

"But—!" he began, with an incredulous laugh.

"Never mind. You'll say it's meaningless. That 'changes' and 'social organizations' are incommensurable as the side of a square and its diagonal —that 'changed social organization' is a noise without meaning. But you're wrong.

"I cannot tell you my sources, but I assure you that there have been many forms of social organization— and that the world was *not* created ten thousand years ago."

Her burning conviction amazed him. Was she, too, mad? As mad as the little burglar?

"Try to understand this: thousands of years ago there was a social organization without Emperor or Stars. It was destroyed *by people firing from fliers*. It was a terrible way to fight. It killed the innocent—mother and child, armed man and unarmed. It poisoned food so people died in agony. It destroyed sewer and water systems so the homes of people became stinking places of corruption.

"The social organization was destroyed. People abandoned homes and cities . . . yes, they had cities; ours still bear their names. They lived like talking, suffering animals who only knew that things had once been better. Every year they forgot more of what that something better had been like, but they never forgot the supreme horror of death from the skies. Every year the details of it grew more

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cloudy and the thing itself grew more terrible."

Cade nodded involuntarily. Like a night attack, he thought; the less you saw the worse it was.

"There were centers of recovery—but that's no part of my story. You said you didn't believe in jetters and bombles? Cade, the jetters and bombles were *real*. The Beefai-voh and the rest of them are the names of the fliers that brought the supreme horror to that social organization."

"The Caves!" said Cade. The place called Washington, the rumbled ruinous blocks of stone with staring black eyes in them, haunted by the bombles—

"Yes, the Caves! The Caves everybody is afraid of and nobody can explain. Cade, you must fight. If you don't, you're throwing our lives away on folly."

Cade didn't believe it. The vague appeal to sketchy evidence—it was as if a patrol leader came back and reported: "Sir, I didn't see it but I—think there's a two-company enemy group somewhere up there, in some direction or other." He gripped a grabiron in his fist until his knuckles went white. Ten thousand years of Emperor, Klin, Power Master, the Order and the Stars and the Commoners—*that* was the world.

"They're coming up fast," she said emotionlessly, staring at the screen.

"Where are the guns?" he said hoarsely, not meeting her eye. And he knew he was only pretending to believe her story, pretending it was true so he could save her and himself at any cost in self-loathing.

"In the chart locker. Ten, I believe."

Ten guns. He would be able to fire at unheard-of aperture until coils fused and toss one aside for another. Ten guns—like that. As though a gun were not an individual thing, one to an Armsman, touched by the Gunner Supreme—the Gunner Supreme he knew for a treacherous voluptuary!

"We must get spacesuits on," he said. He opened the locker and began to select his own units. After three years he remembered his sizes. He dogged a pair of Number Seven legs against the bulkhead and tugged himself into them, donned Number Five arm pieces and sealed a torso unit around his body and to the limb units. He selected units for the girl and helped her into them; she didn't know how.

"Helmets now?" she asked calmly.

"Better carry the . . . the guns to the cargo room first." They made two arm-loads. Cade wiped a palmful of gum against a cargo-room bulkhead and stuck his load to it in a neat row. The girl ranged hers beside them.

"Helmets now," he said. "Then you go back to the control room. I'll air-tight this section and open the cargo lock. You watch the screens.

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Do you know the alarms?" She shook her head. "The proximity alarm is a loud buzzer. I won't hear it in vacuum; you call me on the suit intercom when it goes off. Just talk into the helmet. If I succeed in driving them off, you'll have to bleed air out of the control room until pressure is low enough for me to open the door against it. You hold down the switch on the upper left of the control array that's labeled 'Space Cock.' Can you do that?"

She nodded and they clamped on the plastic domes and sealed. "Testing intercom. Do you hear me?"

"I hear you," sounded tinnily inside his helmet. "Can you turn your volume down?"

He did. "Is that better?"

"Thank you." That was all. A casual thanks for lowering his volume and not a word about his decision. Didn't she realize what he was doing for her? Was she fool enough to think he believed her wild "history"?

He sealed the fore and aft doors and plucked one of the guns from the bulkhead. Full-charged. No number. What did a gun without a number mean? A gun without an Armsman matching it was unthinkable—but here were ten of them. Cade set each gun for maximum aperture and tight band, bled the air out of the compartment by a manual valve and spun open the big cargo lock.

After that there was nothing to do. He floated and waited and tried not to think. But in that he failed.

What did he know—and how did he know it?

He knew Armsmen were Armsmen: fighters, masters of the gun's complexity, masters of fighting, the only masters of fighting there were. That was an essential datum. He knew they were in the service of the Emperor—but that datum had crumbled under the ruthless words of the Power Master. He had known the Gunner Supreme was the embodied perfections of the Order, and that datum was a lie. He had known that it was abomination to fire from a flier—and found himself about to commit the abomination. He had know that for Armsmen there was only one woman, and not a woman of flesh: She who came fleetingly to those who died in battle, and in her fleeting passage rewarded Armsmen for their lives of abstinence. But he knew that for him there was another woman now—sometimes mystagogue, traitress, weak-minded noblewoman, expounder of insane "history." What did he know and how did he know it? He knew that, false to the Order and to She who came, he wanted this woman and did not know her secret.

"Proximity alarm," said the voice in his helmet.

"Message received," he said automatically in Armsman style and smiled bitterly at himself.

Cade kicked his way to the array

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of guns. Two he gummed to his thighs and two he clasped in his gauntlets. It was a grotesque situation. One man, one gun, it was supposed to be. But why? he demanded. Why not one man, two guns; one man, four guns; one man, as many guns as he needs and can lay his hands on? He shoved off to a port and began a hand-over-hand, spiderlike crawl from one quartz disk to the next, peering into the star-powdered blackness. The sun was astern of the flier; it would throw the rams into glaring relief. They wouldn't be able to stalk the victim in its own shadow.

There was a triple wink of light that became a blaze ripping past the ports. The rams had overshot in their first try at becoming part of the same physical system as their prey. They would return—

Cade wondered whether there could be peace in the Mysteries from the confusions that plagued him, and recoiled from the thought. He knew them, at least, for what they were: traps for the johns and clink for the blades. Peace? Perhaps there was peace at Mistress Cannon's where a man could wallow deep until not one ray of sunlight found him. At Cannon's you could drink and drug while you had the greens, and then it was a simple matter to haunt dark streets until you found your nervous, late-going Commoner. And then you could drink and drug again where no ray of sunlight could find you. If firing from a flier was right, could a life at Cannon's be wrong?

The rams appeared ahead again and the flier seemed to gain and overtake them. Cade knew it was an illusory triumph; he was being bracketed. They were far astern now.

What did he know and how did he know it? He knew the Order and the Klin Philosophy and the Realm of man had been created ten thousand years ago. He knew it because he had been told it by everybody. How did they know it? Because they had been told it by everybody. Cade's mind floated, anchorless, like his body. He didn't believe in jetters and bombles. That was for children. But he did believe in not firing from fliers. That was for Armsmen. Children and Armsmen had been told all about it.

"I'll take you to the Caves.

"And the Beetu-nine will come to tear your fingers and toes off with white-hot knives of metal.

"And the Beetu-five will come to pepper you with white-hot balls of metal.

"And the Beefai-voh will come and *grate* your arms and legs with white-hot metal graters.

"And last if you are not a good boy the Beethrie-six will come in the dark and will hunt you out though you run from Cave to Cave, screaming in the darkness. The Beethrie-six, which lumbers and grumbles, will breathe on you with its poison breath and that is the most horrible of all, for your bones

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will turn to water *and you will burn forever.*"

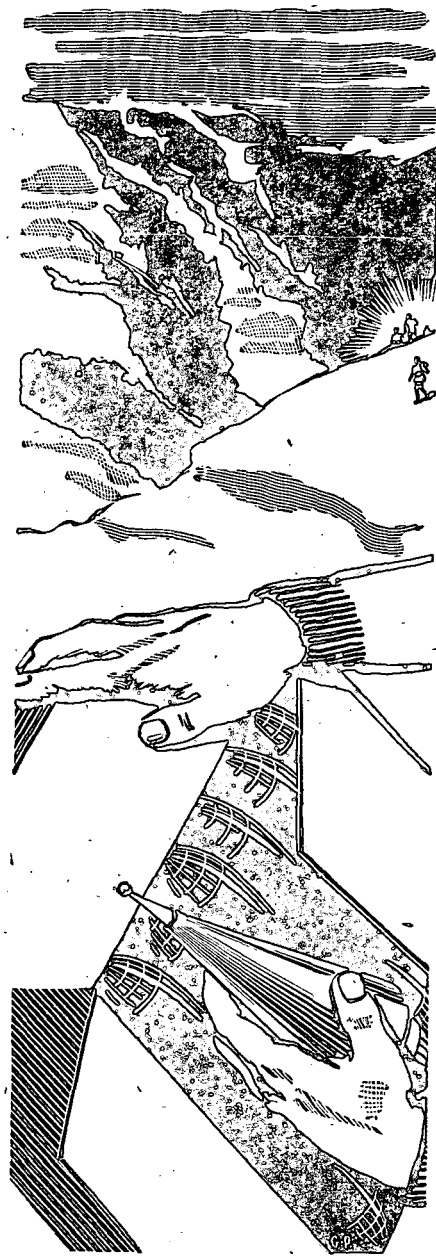
The three rams blazed past the open port again and seemed to hang in space far ahead of the flier. Their next "short" might do it.

". . . But oh, my pupils, there is worse yet to tell. This unfortunate young man who began by neglecting his Klin lessons did not end merely as a coward and thief. On reconnaissance flight he lost altitude and came under the fire of ground troops. I need not name the Thing he did; you can guess. Smitten by remorse after his unspeakable deed he properly took his life, but conceive, if you can, the shame of his Brothers — "

". . . Heartbroken, but it had to be done. I never knew he had a rotten spot in him, but I saw the paper myself. He 'solved' Tactics VII, if you please, with a smoke screen—sending a flier over the enemy's left flank and having the Gunner set fire to the trees with a low-aperture blast of his gun, uh . . . from the, uh, from the air. It just shows you can't be too careful— "

"I receive this gun to use in such a way that my Emperor, my Gunner Supreme and my Brothers in the Order will never have cause to sorrow— "

"They're bunches in the square; we'll have to blast them out with a frontal smash. Cade, take your flier over for an estimate of their strength. Leave your gun here; we know they're



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low on charges and it wouldn't do to have yours fall into their hands if you're shot down."

The flier seemed to shoot past the rams again. The next time, velocities would match—

No; it would never do for him to take his gun. He remembered soaring over the plaza, tacking and veering as flame squirted from the densely-massed troops below, busy with his counting. He dropped an imaginary grid over them, counted the number of men in one imaginary square and multiplied by the total number of imaginary squares as he shot back to the command post on the outskirts of the Rhineland village with his estimate and joined in the costly advance on foot.

He had been told and he believed. How much else, he wondered as though a harsh light had suddenly been turned on, had he been told and believed against all common sense and reason?

Bring on your rams!

This time it was neither a short nor an over. Suddenly the three rams stood, less than a kilometer off, as though eerily frozen in space.

They were smaller than Cade's freighter and boasted a wealth of propulsion units, as against the freighter's central main thrust tube and concentric ring of smaller steering tubes. He rejoiced as he saw conning bubbles rise simultaneously on the three craft just behind their ugly, solid anvil-beaks.

A propulsion unit came into play on the outermost of the rams—the reserve. Red haze jetted from a midships tube precisely perpendicular to the main thrust and the ram drifted outward to double its distance from the flier. Its forward component remained unchanged; it neither fell behind nor drifted ahead.

Aboard the two rams in action there must be relief at the flier's failure to take evasive action; they would now be plotting the simplest of symmetrical double-collision courses. Presently one of the rams would jet "over" or "under" its quarry to stand out on the other side the same distance as its mate; simultaneously the rams would add equal and opposite lateral thrust in amount proportional to their distance from the flier, and the victim would be crushed between the two ugly anvil-beaks.

Cade didn't know what standard doctrine was for ramming distance, but he was content to improvise.

Both rams showed red exhaust-mist. One was standing in closer; the other was moving "up" to hem the quarry in. Cade anchored himself at the lip of the open cargo lock; the conning bubble of the oncoming ram was sun-bright in his sights.

The gun gushed energy for three seconds before it failed. Cade hurled it through the lock into space and snatched another from his right thigh.

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It was not needed. The conning blister was still there, but blackened and discolored. He couldn't tell whether it had been pierced, but the ram issued uncertain gushes of red mist from one tube and then another, tacking and veering, and then flashed off at full thrust in what seemed to be the start of a turnaround curve.

The other ram was still working itself painstakingly around the flier with conservative jets of exhaust. Cade, half-through the lock, emptied the full charge of the second gun and a third at his hull, and saw sunlit diamond flashes spraying through space—debris from exploding ports! The ram didn't wait for more, and when Cade looked for the reserve draft it was gone.

A good engagement, thought Cade. Presumably they wore spacesuits aboard the rams in action so he could claim no kills. The conning blister hadn't shattered like the ports—perhaps because it had been extruded into space-cold for only a few seconds and the gun hadn't tickled it hard enough to set up destructive strain. And the psychology of it was important, too. The terrifying novelty of a ship-to-ship firefight, of a gun being used from a flier—Cade laughed thunderously inside the helmet at himself, at the embarrassed entrance board examiner, at the Klin Teacher with his moral lesson, at Novice Lorca's smoke screen, at the Oath of the Gun, at the Gunner Superior of France and his frontal smash.

A small, tinny voice in his ears yelled: "Turn your volume down! Turn it down!"

"I'm sorry, Lady," he said chuckling. "Did you see how I routed them? Now if you can find the space-cock I'll be able to open the door."

She found it and bled control-compartment air into space until he could shove the door open, air-tight it again and start the control-compartment pressure building.

XIX.

He helped her take her helmet off and then she helped him. They stood looking at each other, waiting for adequate words. Her eyes dropped first, and Cade momentarily felt she was ashamed of the thing she had made him do, the faith she had shaken and then destroyed.

But it made no difference now; the faith was destroyed—and for what? Cade stared long and hard at the Lady Jocelyn and a fresh torrent of laughter burst from him, the sound echoing and re-echoing in the vaulted compartment.

It was so ludicrous. There she stood, feet hooked under a toe hold, a squat and misshapen figure no more womanly than the radars or the hulking compression pump. On top of the bulky mass of padding and metal and fabric the flaming, orange-red hair of the Lady of the Court was tangled and

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matted. Her face paint, never designed for beauty, was smudged and rubbed until she seemed a mocking distortion of the woman to whose beauty he had awakened a month ago in an underground center of intrigue.

He did not answer the mute question in her eyes and she did not choose to put it into words. Instead she said quietly: "Help me with my suit, please."

Cade, suddenly sobered, showed her how to unseal the members and stow them in the locker. And then, though he had thought himself past being shocked by the woman, she took him by surprise again. As though she were a Commoner domestic she said: "I'll fix us something to eat. Is pressure up in the cargo room?"

He checked the gauge and spun the door open for her. "Don't come in for a few minutes," she said. "I'll be changing my clothes and washing up."

Cade spent half an hour getting out of his own suit, minutely inspecting it and stowing it away, and performed as many other jobs as he could find. There were not many. At last, cautiously, he hauled himself through the cargo room to the third compartment aft, the living quarters. Its door stood open and he went in.

"Oh, there you are. I was going to call you." She was at the tiny cooker, and two valved bottles of mash were beginning to gush steam. "There's a table and benches," she said, and he clicked them out of the wall, staring.

She had washed up. The soiled Court mask was scrubbed away and the perfection of her face was a renewed surprise. Her hair was bound with a cloth as if it were still damp from washing—he hoped the hair-dye had washed out. And instead of her sagging orange robe she wore a fresh set of mechanic's coveralls. The sleeves and legs were rolled and the belt pulled tight to her waist. She looked trim—and tempting. How did a man—a man not in the Order—go about telling a woman that she was beautiful?

"You've time to wash," she said pointedly.

"Of course, thanks," he said, and kicked over to the vapor chamber and thrust his head and hands in to be scrubbed by the swirling, warm mist and dried by the air blast. Turning to the table he realized with sudden alarm that he was expected to sit across it from her.

"Excuse me," he said, found a coverall for himself, and fled to the control room to change and pull himself together. To sit across the table from her and look at her while he ate! He told himself it was a first step. The sooner he unlearned his role of Gunner the simpler life would be. The mash would help. There was no sundown in space, but his stomach knew the time—mid-afternoon—and he was sure it wouldn't accept meat food for two hours. The coveralls helped, too. He was glad to rid himself at last of the

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Commoner's best-suit he had bought at Cannon's with stolen money. Coveralls were a far cry from boots and cloak, but he had worn them in his Novice years.

Eating was easier than he had expected. There were thigh straps on the benches and the table had a gummy top. It was an illusion of gravity at a time when the digestive system could use such assistance. The girl didn't speak as they solemnly chewed their mash, sucked water from their bottles and fished carefully through the trap of the jar for chunks of fruit that had carefully dehydrated crusts but were juicy inside.

At last Cade said: "Tell me more."

"More about what?" she asked coolly. He knew she knew what he meant.

"You know what. 'History,' for instance. Or, more to the point, what cargo we are carrying and to whom?" He had not forgotten, even while fighting off the rams, the locked cabinets and sealed crates.

"There's nothing more to tell."

"You said before take-off that the ship had been waiting six years."

"It was nothing. Forget about it."

"So you're a liar, too?" he asked hotly. *Anger is a peril.* The thought came unsummoned and he pushed it away; the direful warnings of Armsmen's training no longer bound him. "What other accomplishments does the Emperor's niece have?" he demanded. "I've seen you as traitor and spy. Thief, too? Is the flier yours? Or is it just something you decided to make use of—like me?"

"*Get out of here!*" Her face was white and tense with rage. "Get—out—of—here," she repeated through clenched teeth.

Cade unbuckled the thigh straps and rose slowly, holding the table. He had been used long enough, by Stars and the Order and by her, at the risk of his life. Things were going to go his way for a change. "Do you really think you can get out of answering like this?" he said coldly. He looked down at the girl's trembling shoulders and, thinking of Mistress Cannon who had taught him how, he forced a smile.

She was silent, lips compressed to choke back the words she might regret, eyes flashing the fury she was trying to control.

"It's not that easy," he said. "Even a Gunner can learn the facts of life, eventually. You've done everything you could to destroy the meaning of my vows. What makes you think you can still count on the behavior they imposed?" She was rigidly holding onto herself, but he knew she couldn't keep it up.

"Have you forgotten that I spent three weeks out in the world without you, learning things you never taught me? I saw another woman like you. You don't imagine you're the only one being used by an ambitious traitor? I don't know who your master

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is, but I know hers. The Lady Moia—"

"*Get out of here!*" she screamed. "*Get out! Now!*" Tears streamed down her face as she freed herself and stood, but she was not sobbing.

"No." He pulled himself a "step" closer to her around the small table. "Not until you answer me. You may be content to serve your own master, but I tell you that *I* am tired of being used. For thirteen years the Order used me as it pleased. And then I 'died'—since when the Cairo people tried to use me as a murderer. Their chosen victim, the Power Master, tried to use me in the same way against the Star of Mars. I've had enough! Understand that!"

He stopped, realizing that his impassioned tirade had given her time to gather her own control. "You saved me twice," he said more quietly, "when others tried to use me. Why? To fly this ship? What for? Whose cargo are we carrying? What's in it? *What are you?*"

He hadn't been watching for it; he had looked for collapse instead.

Her hand stung as it whipped across his cheek. He seized her arms as she floundered from the floor; they drifted together against a bulkhead. "Answer me!" he said sharply. She was crying now, sobbing in an agony of frustration and defeat. He felt her tense body relax, completely beaten.

She would fight no more. He knew he could release her and she would tell him what he wanted to know. He meant to release her; he started to. But in some way he did not understand her face was close to his, turned up, suddenly startled and questioning.

He had never done it before. But his face bent down and for a long time, a timeless moment his lips were on hers.

She pulled away at last, and he held fast to a grabiron, oblivious to everything except the surging new sensations in him. This was how a man, an ordinary man, felt about a woman. This was what had been denied him all his life. This was what the Power Master had ruthlessly described in words. This was what brought the Gunner Supreme scurrying from planetary and Realm affairs to the side of the Lady Moia. This was what Jana had offered him at Cannon's. And none of them could understand that it was a thing without meaning to him—until now.

He looked up at her, standing across the room from him now, and made another discovery. She was quite helpless against him.

He had kissed her, but that was not all. She had kissed him, and a whole new world had been in it.

"Jocelyn," he said quietly. He could taste the word in his mouth. It was a plea and a caress.

She said coldly, "I thought that this at least I would be spared from you. I will tell you as much as I can

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and then ask you to leave me alone."

"Jocelyn," he said again. She ignored it.

"I was a spy in the Cairo Mystery," she said bitterly. "You benefited thereby, if you recall. Believe what you like, but I am not a thief. I serve the Realm of Man. As for the cargo, it does not concern you, and I would be a traitor for the first time if I told you more than that. Now will you go?"

"If you wish." There was nothing more to learn, and much that he had learned undoubtedly needed thinking over.

He left the room then and did not try to speak to her again that day. She slept in the cabin aft and he tried to sleep on the acceleration couch in the control room while thoughts tormented him.

Thinking was no help. He was bound to her, whatever she was, whoever's game she played. But no matter how he turned and twisted each new fact, he saw nothing but a reasonless and chaotic conflict. She served the Realm of Man? So claimed the Power Master, offhand killer and father of lies that he was. So doubtless also claimed the weakling Emperor, the rebellious Stars, the treacherous Gunner Supreme.

He had no reason to suppose that there was sense to it at all. Always before things had had meaning: each ritual gesture, each emphasis of wording, each studied maneuver in battle had had a meaning and a place in the fitting world of Klin. Instead it now seemed that it was just a world of random forces clashing because of this man's lust or that man's pride. How could he demand more of her than the world offered?

In the morning he was hungry and it was not unreasonable to go to the galley for food. She was distant and polite and for the better part of a week she remained so. Then he tried once more to question her.

He asked again about History and she bit her lip and told him she never should have spoken as she did and never would have told what she had except to save their lives. "You would do best to forget you ever heard the word."

"Can I forget that I have fired from a flier? he asked gravely and she looked away.

About the cargo she would not speak at all, and his bitterness grew daily at the galling thought that he was expected to be a pawn in some game and be content with the role—he who had led companies and would surely have risen to the rank of Superior.

There were four days left to the voyage when he decided to force the cargo. He could have done it openly; she was powerless to prevent him. But he insured his privacy by noisily rattling the handle of the door to the cabin at midnight by the chronometer. She must have been sleeping lightly.

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In less time than it would have taken him to actually open the door he heard the dogs on the other side thud to. He rattled again, noisily, and then went off, grumbling as loudly as was reasonable. He smiled grimly, wondering when she would find the courage to come out—and more grimly still when he recalled that all the flier's food was on the other side of the dogged-down door. Well, he had fasted for three days before. And now he would find out who was playing with his life.

The metal sheathing on the free-floating crates yielded easily to the lowest aperture of a gun. The contents of the crate nearest the break-through point were also metallic, but were undamaged by the blast of the gun. Guns were in the crate—at least a thousand of them. Guns of the Order, or replicas, full-charged and without numbers. He was not really surprised.

Methodically Cade opened the three other crates—all the same. And the lockers? The locks were radionic and not simple, but he solved them, each quicker than the last, and sampled the contents.

At the end he went back to the control room making no effort to cover up his work.

Ten thousand guns of the Order, bound for Mars. He knew now for whom the Lady Jocelyn worked.

He slept, and in the morning tried the cabin door. It was still dogged down, and he called on the ship's interphone.

"What do you want?" she asked coldly.

"First, to apologize for disturbing your sleep."

"Very well."

"And something to eat."

"I can't see how to get it to you," she said indifferently.

"You can't afford to starve me. I still have to land the ship, you know."

"I have no intention of starving you." There was a hint of humor in her voice. "I was thinking it might be a good idea to *weaken* you a little."

"I've weakened already," he said. "I did some hard work last night, and I need food."

"What kind of work?"

"I'll show you when you come out." He didn't have to wait long. There was a scant ten minutes of silence, before she called back:

"If I bring you some food, will you give me your word not to make a fool of yourself?"

"Certainly," he said cheerfully, "if you feel there is any value in the word of a lapsed Armsman. By what shall I swear?"

Silence.

Then, almost timidly: "By yourself."

And it was thoughtfully he answered: "By myself, I swear that I will do nothing to distress you."

"All right. Five minutes," she said, and cut off.

It was a long five minutes.

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Cade waited. He heard the dogs thud back and the door open. Silence then, and he made himself sit still waiting. Ludicrously, a valved bottle of mash floated through the open door from the cargo room. It must have drifted from her hand when she saw the ripped open cargo. Cade watched the bottle bump to a gentle stop, and rebound from the bulkhead to drift within his reach. He was hungry, he wanted the food but let it slowly pass him. Jocelyn floated in a moment later, pale but self-possessed.

"All right," she said, "now you know. Don't ask me to explain, because I won't. I can't. Not if you tried to get it out of me by torture. I have some loyalties I do not violate."

"I have not," he said briefly. "What was left of them you violated for me. And I'm not going to ask you to explain. You keep forgetting that I've talked to others besides you these last few weeks. The Power Master, for instance. And a miserable little Marsman who came to Cannon's to forget his loneliness. And—" He thought of the Mars-born Gunner, Harrow, who had died for a terrible sin. "And others," he finished shortly.

Cade picked the bottle of mash from the air and tasted it.

"All right," she said and dropped all pretense of indifference. "Just what is it that you imagine you understand?" He let the bottle go; the mash was cold and he was no longer hungry.

"To start with, I know what loyalty you hold."

He waited, but she said nothing. "I won't pretend to understand why a starborne Lady should serve as spy for the Star of Mars, but—" He paused with satisfaction. Her face was impassive but one sharp breath indrawn had given her away. "Do you deny it?"

"No. No, I don't deny it."

"Then perhaps you will want to explain it?"

She was thoughtful and she spoke reluctantly: "No. I can't. What else do you know?"

"Why should I tell you?" He was bargaining forthrightly now. "Why should I answer *your* questions?"

"Because I know more than you do. Because there are some things it's dangerous to know. If you've found them out—besides," she added, "I can't possibly tell you more until I find out just how much you *do* know."

"All right." He had nothing to lose—and he wanted to talk about it. "I'll tell you what I know and what I think:

"First, I have known for some time that the Star of Mars is petitioning the Emperor for the assignment of Mars-born Armsmen to his Court. Till now, of course, they have always been dispersed among the Earth Stars. But a month or more ago, requests were being made for the return of seasoned Mars-born Gunners, and

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for the retention of native Novices on Mars when they reached the rank of Armiger.

"Second, I know the Power Master is determined that this petition shall not be granted. I *think* I know why—"

She leaned forward just a little, eager for what he might say next.

He went on, deliberately shifting his ground.

"Mars wants its Armsmen at home, and the Power Master will not allow it. The reason is so obvious it would never occur to anyone outside the little clique of schemers and tricksters and—History students in which you live! It's Mars iron, nothing more."

She sat back again and seemed almost bored; this was nothing new to her. Then he was on the right track.

"All of Earth's machinery needs Mars iron. If the Star of Mars had an Order of his own, composed entirely of Marsmen, with their peculiar devotion to their homes and families—I've talked with them, and I know how they feel—then he would hold more real power than the Emper—than the Power Master himself."

He laughed out loud, remembering the waking formula that had prepared him for the day each morning for six thousand days of his life.

"*It is fitting that Armsmen serve the Emperor through the Power Master and our particular Stars. While this is so, all will be well to the end of time,*" he quoted aloud. "I said that many times each day for many years," he told her.

"I think the Star of Mars knows his request will never be granted, and I think he is now preparing to train an outlaw Order of his own to serve the same purpose."

A fleeting smile crossed her lips; in spite of everything, Cade realized, she still thought of him as a Gunner, with a Gunner's attitudes. She could not possibly have realized how much she was revealing with that small smile of satisfaction.

He had half-guessed before, but he was certain now, that the training of outlaw Armsmen had already begun. It took three years of novitiate drill before a Brother was given a practice gun in the Order proper. How many of them were there? How many half-trained, wholehearted Marsmen waiting right now for the guns he was bringing on this ship?

For the first time in ten thousand years, guns would be fired that had never been touched by the Gunner Supreme. Then he remembered: not in ten thousand years. In History—whatever that was.

"What purpose?" she asked.

Cade snapped to attention. He had let his thoughts carry him away, and had been silent too long.

"Oh—a private armed force of his own. A force powerful enough to make a stand against the Earth-born Armsmen. It wouldn't have to equal the combined strength of all Earth forces

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—nothing near that. He must know the Power Master will never let Earth Stars combine to that extent. These guns—the guns you would have had me carry unawares if you could—will make him strong enough to become Power Master—or Emperor in your uncle's place."

He stopped talking and waited. She said nothing.

"Well," he asked impatiently. "Can you deny it? Any of it?"

"No," she said slowly. "None of it. Except one thing. I am—you *must* understand, Cade—I have worked for him and I shall again, but I owe no loyalty to the Star of Mars. I am no paid spy." She said the words with such unmistakable contempt that for the moment Cade found them hard to disbelieve.

"For whom, then?" he demanded.

"I am no paid spy," she repeated, and the denial lost all meaning because she would not answer his question. "Nevertheless," she said steadily, "much of what you have said is true. There are still things you do not know. Things I don't dare tell you. They are dangerous even for me to know, and far more so for you. Others are involved—"

She stopped abruptly, obviously sorry she had said so much.

"The Great Conspiracy!" Cade sneered. "Every Star a Power Master! Add chaos and confusion to cruelty and unreason!"

"No," she said breathlessly. "No! Cade, I cannot tell you more."

"You've said enough," he answered quietly. "Unless you want to tell me why you chose to work against the Cairo group in favor of another conspiracy like it?"

"No!" she said passionately. "Not conspiracy—healing!" Words and dreams bottled up too long began to flow; her face passed from earnest pleading to the raptness of a visionary.

"Healing the life of Man! Saving it from the dead grip of the Power Master and the frozen Klin Philosophy. How can I make you understand? I've told you about History, but it's nothing more than a word to you. You haven't studied—

"You don't know what 'science' means, do you? Of course not; the word is half forbidden and half forgotten because science means change and change means a threat to the Klin statis and the Power Master.

"Mankind is dying, Cade, because men are chained to their machines and forbidden to make new ones. Don't you see that one by one the machines will wear out and—"

"No," he said warily. "I don't see. The Brothers of the Order build machines. When old ones are gone, new ones are always ready. Klin Teachers study and build machines."

"But no new ones," she said. "Science means *new* things, Cade; searching for the truth with no roads closed, no directions forbidden. Cade,

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there was a time—I know from History—when men powered their machines with the metal uranium. It's gone now. Thorium was used next, and now it's gone, too. And now the iron. Earth's iron is gone. When the Mars iron is gone, too, what next? There should be ten million men working day and night to find a new power source, but there are none.

"There are other ways to destroy civilizations besides—firing from fliers! They'll have to stop making fliers and ground cars. The cities will become great sewers when the pumps stop turning. Inlanders will get sick with ugly lumps of wild tissue growing from their necks because there won't be anybody to bring them fish and salt from the oceans. Babies will grow up crooked because there won't be power for the milking machines of the food factories, or the boats that catch the cod and shark. Animals will overrun their growing food because there won't be wire for fences or power to charge them. Diseases will rot mankind because there won't be power for the biobrug factories." She stopped, worn out with her own intensity, and watched him silently. "Does it mean anything to you?" she asked with a touch of bitterness.

"I don't know," he said bemused. He was thinking of what the Power Master had said to him that day, with Kendall dead on the floor. It made this much sense at least: that here were two honestly opposing forces. The Power Master's view of the world made more sense, from what he had seen of it, than Jocelyn's, but—if what she said was true a man could have something to fight for again.

"All that," she said quietly, "can be cured by science. And there are other things—'art' is one. It means exploring this universe and making new universes with language and sound and light. It makes you laugh and weep and wonder; no man alive now knows about the joy of making and giving art, or the joy of receiving it from the maker.

"You don't know what 'freedom' is—perhaps you'll learn—soon. I hope—" She hesitated and looked up at him defiantly. "I hope when we reach Mars you will accept service under the Star of Mars. He is the man to follow at this time. But for now, *I cannot tell you more.*"

"Then I won't ask," he said. There was too much to think about already. And he knew all he really needed: he had learned the meaning of at least one new word, and that was "love."

XX.

They had three days more of space—days in which Cade found it less and less hard to remember that the Order was behind him. The old life was finished; there was just one certainty now—a woman. The only possible woman for Cade in the new life,

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just as the Lady of the Order had been the only possible woman for Cade the Armsman. Until they landed he could share a growing friendship and—something more. What might come later he did not know, except for one thing: if they lived through the landing on Mars he would find some way to stay at her side. The Star of Mars could be no worse a master than the Star of France. Surely he was a worthier one than the Power Master.

Knowing this much and no more, Cade used the time he had to win the liking and strengthen the confidence of the Lady Jocelyn. Never had he known himself capable of such fluent conversation or such avid listening.

Too quickly, Mars filled the heavens and Jocelyn's gentle friendliness disappeared behind a barrage of preparations and crisp instructions.

The co-ordinates she designated took them to a craggy basin in the southern hemisphere, less than a hundred kilometers from the capital city of Mars.

The spot had obviously been chosen to afford a combination of convenience and secrecy. From the air it was one of those blank patches that showed neither red nor green but only featureless gray. No red meant no iron; none of the characteristic family-operated strip mine refinery complexes of Mars. No green meant no water: no farms and farm-families raising vegetables and goat meat for the miners and city-dwellers of the planet. Featureless gray meant unobserved isolation.

Cade braked the big flier to a stop on level ground as though it were a ground car. He unbuckled himself from the control seat and looked out of a port at a desolate valley surrounded by gnarled old hills as high as any on sandstorm-lashed Mars. Jocelyn at his side surveyed the emptiness impatiently. She was already swathed in bulky synthetic furs.

Cade found a suit for himself and donned it. He came back to find her pacing the small area of cabin floor.

"Can your lungs take Mars air?" she demanded

He nodded. "I've fought in the Alps and the Taurus." With Brothers crumpling about him, he remembered—brave men, tireless men who happened to lack the body machinery for battle on half-rations of air. "How about you? There's a respirator in the locker."

"I've been here before." She stopped him with a nervous gesture at the air lock.

Cade set the mechanism in motion and there was an equalizing outrush of air. Momentarily his sight dimmed and he had to cling to an iron for support. The girl, lighter and with bigger lungs, recovered before he did and was through the lock before he could walk certainly. Her eyes swept the horizon anxiously. "Your work on the crates isn't going to make things easier," she said. "We'd better start unloading and have the . . . the

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cargo ready to go."

"To go to the Star of Mars?"

"Yes."

He followed her back into the ship and opened the cargo port amidships. While she emptied locker after locker, Cade moved the bulkier crates outside. Fifty meters from the flier the pile of guns grew tall. But at every trip the girl's impatient scanning of the horizon was repeated.

"I assume your friends are late?" he asked uneasily.

"The less you assume, the better," she said. And then she uttered a gasp of relief. There was a black dot topping a hill and then another—dozens, hundreds at last.

"The Armsmen of Mars?" He was torn between surprise at their unexpected numbers and contempt for their ragged approach.

"No, not Armsmen, Cade. The word is 'patriots.' You've heard it before." There was an unreadable quality in her voice. Cade could not tell whether she despised these people or admired them. "It means that they love their home land. They are devoted more to Mars and its ruler than to the Emperor."

He couldn't help it; a shudder went through him at the thought—and a moment later he was smiling at the shudder.

"They're just porters then."

She started to shake her head and then said: "In effect, yes. Just porters."

The crowd was drawing nearer. Patriots or porters, whatever they were, Cade saw clearly that there were no Armsmen among them. They were farmers, miners, clerks from the city. They walked easily as you'd expect Mars-born people to, and clearly had no difficulty with Mars air. Their clothes were lighter than the furs he and Jocelyn wore against the chill. And they all carried uncouth sacks over their shoulders. Cade thought of the guns jostled and scraping together in the sacks and set his teeth obstinately—a gun was just a killing-tool the way a saw was just a cutting-tool.

There were boys in their teens and not a few women among the mob; it numbered some nine hundred to carry about fifty thousand guns.

How, he wondered, could this rabble keep a secret? And then he thought of Harrow, the dead Gunner: "A man likes to be among his own people—It's newer on Mars—I don't suppose *you* know anything about your eight-times great-grandfather—" If all these people shared that feeling—With the crowd came noise, the undisciplined chatter of nine hundred excited people.

A tall, lean-faced fellow in his middle years turned to the rest and yelled sharply through the thin air: "Just shut up, all of you! Shut up and stand where you are!" A few lieutenants repeated the crude command. After a minute the shipward drift of the crowd halted and there was silence.

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The man said to Cade: "I'm Tucker. There wasn't anything said about a woman. Who's she?"

The Lady Jocelyn said dramatically: "A daughter of Mars." If there was the faintest tinge of mockery in her voice, only Cade thought he heard it.

The lean-faced man said, feelingly: "Mars blesses you, Sister."

"Mars blesses us all, from the highest to the lowest." It seemed to be password and countersign.

Tucker said: "We're glad to have a high-born Lady among us, Sister. I was told the flier of the ship wouldn't be a Brother?"

"Not yet. He will be. He is an Earth-born Gunner who will train Marsmen for the day of liberty."

"It's growing," said Tucker rapturously. "Nothing can stop it!" It was beginning to sound more like the mystic nonsense of the Cairo gang than businesslike military identification procedure.

The mob was getting noisy again and military procedure took another body-blow. Tucker turned and bawled at them: "You all shut up now! Get into some kind of a line and get your sacks open. And don't take all day!" Cade watched them milling and groaned at the thought of turning such a mob into Armsmen. But he swallowed his disgust; what she wanted of him, he would do.

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They did get whipped into line eventually by roaring non-coms. Cade couldn't make out whether these were merely *ad hoc* self-appointed leaders or whether there was any organization in this gang. But somehow a dozen Marsmen got busy sorting out sixty-gun piles from the heap and dumping them into waiting sacks. The guns couldn't have been carried under Earth gravity, but their weight on Mars constituted no more than a good working load. Cade was very glad that guns of the Order had two centimeters of six-kilogram trigger pull before you hit a five-gram pull and firing contact. There were no accidents.

Jocelyn told him busily: "We won't need the ship and I don't want to leave it here for a monument. Shoot it off to somewhere on automatic take-off."

It was sound doctrine. By the time the empty flier roared off, its ultimate destination an aimless orbit in space, the tail-end of the line of porters was snaking past a melting pile of guns. Tucker, the lean-faced "patriot" leader, was yelling again, trying to make himself heard over the combined noise of rockets and rabble, to get them to form a new line of march heaving out of the valley.

As the noise of the vanishing flier was lost in the distant sky, the man's shouts were drowned out again by the terrifying crescendo of jets. Not one ship this time, but a fleet. An instant later a hundred or more space-recon fliers roared low over the hill-rimmed basin.

They fanned out beautifully to land beyond the crags in a perfectly-executed envelopment on the largest scale Cade had ever seen. He wondered numbly whether the brilliant maneuver had been performed on individual piloting or slave-circuit control.

The Martian rabble broke its uneven ranks. Nine hundred of them milled pointedlessly about asking each other frightened, stupid questions; the total effect was a thought-shattering roar. The Lady Jocelyn's hand gripped Cade's arm through the wadded sleeve of his furs. Her face was deathly pale. He must have radar stations on Deimos and Phobos, Cade thought, to pin-point us like this—

Then there was a voice—the kind of voice nine-year-old Cade, Gunner-to-be, had thought the Emperor spoke with. It roared like thunder through the basin of rock, breaking against the rim and rebounding in echoes. It was the voice of the Power Master, the voice Cade would never fail to know whether it spoke cynically across a room, commandingly over the radio or as now coldly into the thin air of Mars.

"Marsmen, my Gunners are taking up positions surrounding you. You will drop your bags of weapons and walk to the foot of the hills to surrender. I want only the two persons who landed by flier. They must be held but the rest of you will be

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released after a search. You have fifteen minutes to do this. If you do not, my Gunners will advance firing."

Silence from the hills and a growing mutter from the crowd.

"Who are they?"

"Who's the man from the flier?"

"They said he's no Brother!"

"*Get rid of the guns!*"

"They'll burn us down where we stand."

"What will we do?"

"*What will we do?*"

Cade shook his head dazedly; Tucker was glaring at him.

"*He's lying!*" shrilled a clear voice —Jocelyn's. "He's lying! Do you think he'll let you go when you're helpless? He'll kill you all!"

Her warning was lost in the roar, except to Tucker and Cade. The lean-faced Marsman said to her slowly: "When we're helpless? We're helpless now. We've drilled some, but we don't know guns."

With the brutal mob-noise for a background, Jocelyn spoke again, softly and almost to herself. "Two hundred years," she said emotionlessly. "Two hundred years of planning, two hundred years of waiting, two hundred years of terror waiting for a traitor or a fool to talk, but nobody did. One gun, two guns, a dozen guns a year at last, waiting—"

She was swaying as she stood; Cade braced her with his arm.

"What a dream it was—and we came so close. Mars in rebellion, the Klin Philosophy shaken, Armsmen split, the Power Master defied! Men on Mars—men everywhere—thinking for themselves, challenging the traditions that tied them down. Thinking and challenging!" A blaze that had kindled briefly in her eyes seemed to die.

"We underestimated," she said flatly. Now she was talking to Cade. "We didn't allow for the dead weight of things as they are. Two hundred years—I hope my uncle will not suffer when he dies."

Her uncle. Cade hung onto that; he knew at last. "The Emperor," he said slowly, "the Emperor knows of all this?"

"Yes, of course." There were tears behind her voice. "The Emperor—the last five Emperors, powerless in everything except knowledge. They and a few others in the family, a handful of men and women. Three generations ago the reigning Emperor saw that Mars was the key, that the Mars rulers would rebel and the Mars populace would be with them. The Emperor-Mars pact was concluded fifty-five years ago. My uncle wrote the Star of Mars' petition. What a great dream it was! But what difference does it make now?"

I hope my uncle will not suffer when he dies. But he would; the Emperor would suffer and so would she. The Power Master would not let them die until he had wrung every bit of information from them that they held.

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Abruptly the voice of thunder said: "Eight minutes!" and the Mars rabble flowed around them, scared, angry and confused, demanding to be told what to do and what it meant.

Tucker had been listening, bespelled. "If we could fight," he said hoarsely, working his hands. "If only we could fight!"

"Thinking and challenging," echoed Cade. "Thinking and challenging." Five years to make a Novice. Ten for an Armiger. Fifteen for a Gunner. To face Gunners with anything less than Gunners was like opposing guns of the Order with wooden clubs. Tucker knew that, and still dared to think: *if we could fight.*

They were patriots, Cade thought; now he knew what it meant. They were frightened now but still they held their sacks of guns. They weren't ready to give in yet.

Cade said the impossible: "*We can fight them.*"

"*Armsmen?*" said the girl.

But there was wild hope on Tucker's face. "They're trained," he said foolishly. "They've had three years."

"There's no other way," Cade said to Jocelyn, ignoring the Mars leader. "It's a cleaner death, and—*you* taught me to challenge the rules."

He fired his own gun straight up in a three-second burst at full aperture and a stunned silence fell on the crowd.

"I am Gunner Cade of the Order of Armsmen," he shouted into the thin air. "You have guns—many more guns than the Armsmen in the hills. I will tell you how to use them."

XXI.

Thoughts blazed through his mind. The complex gun; the thing no Commoner could master: First Study of the Primary Circuits of the Gun, Ceremonial of the Gun, Order of Recharging, After-charging Checklist, Malfunctions of the Booster Circuit, the Sighting Picture, the Gun's Inner Meaning in Klin, Aperture and Band Settings for Various Actions. In studied sequence they flashed across his mind, and one by one he threw them out.

"The way to use your gun," he shouted, "is to point it and pull the trigger. If it stops firing, throw it away and grab another." To Tucker he said swiftly: "Have you a dozen men the others will listen to?"

The lean-faced man nodded. "Get them here," Cade said. While the names were being shouted he turned to scan the encircling hills. Against the sky he could see the slender rods of radionic grids faintly discernible—ten or so, spaced around the rim of hills. What contempt they must hold him in to expose command posts like that!

Where to attack with his rabble? Straight ahead there was a nice little pass in the hills. Standard doctrine was for the defenders to command such a pass by plunging fire. Standard

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doctrine in the attack was to draw fire from the defenders, pin down the defenders exposed by their fire and storm the pass. The Marsmen had no training to prepare themselves for such an encounter. But off to the right was an ugly little cliff—a cliff nobody in his right mind would bother to attack or defend. It would be covered by a Gunner or so, no matter how unlikely it was. But was it so unlikely to be scaled by Marsmen to whom the air and gravity were normal—?

"Here are the men." Cade looked over the dozen lieutenants Tucker had called up and proceeded to instruct them. A long line of his teachers would have cringed at his instruction. He showed them only the triggers, the band and aperture sets and the charge gauges. They didn't need to know how to recharge; there were guns to spare. They didn't need to know the care of guns, the circuits, the ritual, the inner meanings—all they needed was to know how to shoot. As he showed them, his wonder almost equalled theirs at the simplicity of it all.

"We will head for that cliff," he said, pointing. "Try to show your men what I showed you before we get there. Don't try to keep order on the march. The worse it looks, the better for us. That's all."

He gave them a minute and then stepped off for the rim of hills. He yelled a command which he dimly realized was more ancient than the Order itself and exactly as old as History:

"*Follow me!*"

"For Mars! For the Star of Mars!" someone shrieked insanely, and others took up the howl. Cade didn't look behind him. If he had them all, good. If he didn't, there was nothing to be done about it. Perhaps some would start with him and others hesitate and then follow—so much the better. To the ring of steady-eyed Armsmen watching from the hills, this charge across the plain would seem a panic flight. Even if they had picked up the gist of his orders to the mob with a three-meter directional mike trained on him, or seen the scattered efforts of lieutenants to instruct their groups it would seem inconceivable to them that Commoners would fight.

Not that they would; Cade knew it well enough. They'd balk at the first blast of well-aimed fire. They'd shriek and run like—Commoners. Mars or Earth, a Commoner's a Commoner; sluggish, overstuffed, stupid, soft. *Point your guns and pull the trigger.* Fine words, he mocked himself, fine words! They were supposed to have had three years of "training"—form-fours on the village square, no doubt, an hour a week. Even that didn't show. None of them had *seen* a gun before.

Thinking and challenging, he mocked. Thinking indeed, that challenged the one bedrock truth he knew: that Armsmen were Armsmen, fighters,

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gun-handlers, the only fighters there were.

It was insanity; *that* truth he knew, and the other truth that made insanity his only course. If the fight was lost, he was already dead, and so was *she*.

She was running alongside, keeping pace with his strides. "Do you think—?" she asked wildly. "Cade, it's the *Power Master's Guard!* They can defeat any force of Armsmen in the Realm."

"We're not Armsmen," he growled. "We're a mob of crazy *patriots*. We don't know how to fight, but we seem to have something to fight for. Now fall back. Get into the middle of this gang and leave yourself room to run when they stampede."

"I won't!"

"*You—will!*"

Meekly she fell back and Cade strode on. Admit it, fool! he raged. Admit it! You're playing a game, a child's farce—the way you used to play Superior and Novice back in Denver. They've forged a ring of fire around you and you're charging into death: solitary death, because that mob will break and run and well you know it.

A farce? Very well; play it out as well as you can. Gunner Cade, he told himself savagely, trained Armsman, master of fighting that you are—*fight!*

He swung on grimly and the worn, ancient cliffs loomed ahead, grotesque engravings of wind and sand and centuries on deathless stone. If the Armsmen opened fire now, he was lost with his half-trained rabble. They'd never know enough to spread; they'd bunch like sheep and die in a crushed mob. If they reached the dead area under the cliff, there might be a momentary postponement of the butchery.

The Armsmen would have fired before now if they expected trouble. They must be looking for a desperate attempt to push through the nice little pass and escape.

The attack of the Marsmen would have to be swift and deadly. They might take the hill! It was a thing that would rock the foundations of the Order.

"For the Star! For the Star of Mars!" he heard them howling behind him, and grinned coldly. *Patriots!* Perhaps patriots were what you needed for a murderous, suicidal assault.

His feet slipped once on rubble and the shadow of a crag was on his face. "Give me two of your guns, Brother," he said to a boy with bulging eyes and a fixed grin on his face. "Up the cliff!" he shouted over his shoulder at the rabble. "*Follow me—charge!*" He broke into a run and noted coldly that the thin air roughly canceled the advantage of the lesser Mars gravity. The youth at his side, still breathing easily, pushed ahead—and fell a mo-

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ment later with the fixed grin still on his face and both legs charred away by a long-range blast.

Automatically Cade blasted the crag from which the fire had come. The fire-fight had been joined.

Make it or break it now, he thought. Face your death, fire a counterblast or two to let them know you were there, to make them pause a bit and wonder a bit and perhaps fear a bit before your Commoners broke and ran.

"*Follow me! Up!*"

The lean-faced Tucker raced past Cade screaming: "For the Star of Mars!" His sack of guns flapped and bobbed as he began to scramble up the cliff. There were others—wild-eyed men, a panting youth, a leathery woman—who passed Cade.

Behind him there were yells and the blast of guns. He hoped he wouldn't be burned in the back by one of the Marsmen's ill-aimed guns after coming this far—

The fire-fight grew severe as he pantingly climbed the cliff. From the hills it was rapid and deadly. From the Marsmen it was a torrent whose effect he couldn't guess at. The noise the guns made was a senseless blend of small-aperture buzz and wide-aperture roar. Cade scrambled grimly up and hoisted himself over the jagged cliff edge into the racket of a first-class battle. A rudimentary squad of Marsmen was blasting Armsmen across a windrow of fallen comrades. They had learned about aperture by now, Cade saw with bleak satisfaction, and they were learning how to rush from crag to crag to take isolated Armsmen in pockets of the eroded rock by flanking fire. Incredibly, in spite of the numbers of their dead, they were gaining ground. Armsmen were falling.

They didn't need his gun. Cade turned from the shooting and stationed himself at the cliff head, splitting the steady stream of Marsmen as they gained the peak, sending half to the right and half into the fighting to the left.

"Tucker!" he yelled.

The lean-faced Marsman who had led the assault up the cliff was still alive. "Tucker, take this gang on the right and work them through the hills. Keep them moving, keep them firing, keep them yelling. I'll work the rest around the left. If you see any sign of them withdrawing to re-group, keep your men moving but come and check with me. That's all."

"Yes, Brother." Like old times, thought Cade—except that he was fighting now to overthrow all he had once fought for—and for Jocelyn.

He dared not think of that. He had not seen her once since the beginning. Now he had a job to do and was doing well. It had occurred to him at last that they might win.

The cliff-top fighters' insanely extravagant fire had done its work. This immediate arc of the hills was cleared of Armsmen. He saw that the Marsmen were sorted out into ele-

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mentary squads and platoons—a lesson of battle, or fruit of their crude training? Whichever it was, it gave him leaders.

"Follow me!"

And they followed eagerly as he led them left, well down on the reverse slope of the hills. They worked the ragged terrain with style, arranging themselves into units of three—the useful skirmishers' triangle, from which any fighter can rush to take ground under the covering fire of the other two. Was this, Cade wondered wearily, what he had given his life to? This bag of tricks that a crowd of fanatical farmers discovered for themselves at the cost of a few lives? He dropped beneath the blast of an Armsman from a shadowing crag, and did no more philosophizing. When the crag had been undercut and toppled on the Brother, there was a new blast to face, and another, and still another.

Then they were back on the ridge of the hills and found they had taken a command post and its equipment. Some of the Marsmen paused to marvel at the radionic mast and mappers and communicator.

"Keep moving, curse you!" Cade raved at them. "Keep moving and keep firing!"

He lashed them on over the mound of dead CP Armsmen and into a blazing linked fire from a dozen wind-carved pockets in the rock. They had learned well. The Marsmen rushed from one eroded spire to the next—at the cost of a dozen lives they secured flanking positions. A withering enfilade fire wiped out the defending Armsmen in seconds.

He cursed them forward, and the next fire they met was scattered, rear-guard stuff—three men trying to fire like thirty. It was the retreat he had, half-crazily, hoped for: not a flight but a consolidation of forces. The Armsmen would be grouped soon in one mass capable of putting out an interlaced ring of fire. In spite of his green troops' astonishing performance so far, Cade bitterly knew he could not pit them against any such formation.

The mast of another CP was in their newly-won territory by the time they had mopped up the rear guard. He shouted a cease-fire and led his men straight over the rim of the hills instead of working along the reverse slope for cover. He wanted to waste no precious time while there were Armsmen to be killed. They dispatched a communications man, still sending; otherwise the CP had been abandoned. Cade eagerly took his binoculars and studied the work of Tucker's men, to the right. They were strung out more than they ought to be, but one CP had fallen and another was under attack. Signs of retreat were clear on Tucker's front also.

A sudden ferocious flurry of blasts ten meters from him sent Cade sprawling into dead ground.

"What kind of cursed scouts do

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you call your cursed selves?" he raved at his men. "When I said kill them I meant kill them! Let's clean up this cursed ground!"

They grinned at him like wolves and followed in a wild surge that broke through the thin rear-guard screen and clawed with fire into a regrouped main guard. "Feint at *us*, will they?" he yelled, only half-hearing himself in the roar of blasters at full aperture. Before the butchery was over his Marsmen had lost heavily and another CP was in their hands. The Armsmen's retreat this time was no feint.

He sent forward scouts to harry the Armsmen. From the captured CP he studied neatly-ranked recon fliers, two hundred meters from the reverse slopes of the circling hills. And something incredible was happening. The antlike figures of Armsmen were making for the fliers. They weren't going to stand and fight. They were racing for their fliers.

"Fire on them!" yelled Cade. "Pass the word to fire!" There would be no hits except an occasional accident, but it would let the Armsmen know he was there.

A few of the antlike figures knelt and returned blasts, fearing a rush.

Tucker was there. "You told me," the lean-faced man panted, "to report, but I couldn't get away—"

Cade didn't rebuke him, and Tucker ventured a note of triumph: "Gunner, we got their headquarters! That stopped them, didn't it?"

"It shouldn't," Cade said—and then realized the full extent of what had happened. Laughter burst from his lips. "Yes," he said, "that stopped them." Even with his words they heard the first of the fliers blast off at maximum. A moment later there was another.

Cade followed his second in command across the now-secure inner plain to inspect the headquarters CP for himself. The roar of his snipers' guns mingled with jets on takeoff was sweet to his ears.

Eagerly he examined the remains of the CP the Marsman had taken, and there was no mistake possible. It was a well-selected position, as good a headquarters as the terrain could offer. It commanded a good escape route down the reverse slope to the fliers and a good three-hundred-sixty-degree field of fire and observation. But the fury of five hundred Marsmen had overwhelmed the strategic knowledge of ten thousand years. The CP was a shambles of ruined radios and maps, telescopes, bull-horns, all the heavy equipment of command. And over the rubble were strewn the bodies of Armsmen.

Cade let out a long halloo: "*Hold your fire! Pass the word!*" The command rang victoriously along the hills.

He walked to the central control panel of the communicator set and looked down at the crooked corpse

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that lay over it, a corpse half-charred and without a cloak. He rolled the body over and stared into the granite countenance of the Power Master.

Dead—dead because he would not give his power to a subordinate. Dead because he had to witness the victory himself. He hadn't expected battle; none of them had.

The cease-fire had been luckily timed. Earlier it might not have been obeyed. Later it might have occurred without an order. Even so there were irreconcilables who could not bear the helpless retreat of Armsmen by the hundreds to their fliers. Several continued to fire for a minute and one woman ran shrieking down the rocks until she was picked off.

Cade watched the cloaked and helmeted figures swarming into the slender spaceships, blasting off northward, lifting empty crafts whose complements would never fly again on slave control. They would take news of this day with them and spread it through the Realm of Man.

It was incredible that they should have won, thought Cade—but no more incredible than that Commoners should have fought at all.

Patriotism?

He studied Marsmen sprawled on the ground nearby, wearily. One little knot was singing some song or other about Mars. Others were talking loudly, with exaggerated laughter. One man was sobbing hysterically; he seemed to be unwounded. Many sat in silence with furrowed brows, or in near-silence, exchanging halting words.

"Yes," Cade heard, "but what if more of them come back?"

"There will be more of us. I have five brothers—"

"Yes . . . my boys are big for their age."

"They killed Manley, I don't know what I'll say to his wife."

"They'll take care of us. Her, too."

"They *better* take care of us—"

Cade walked restlessly along the ridge, looking for something he dared not think about, through the territory that had been held until minutes ago by Power Master and Order and all the other trappings of the past.

Patriotism! The Brothers would be more wary the next time they were sent to fight against it. It was easy to imagine the bored confidence with which the five-hundred-odd Armsmen had left their fliers and climbed the hills. They had thought themselves out on an elaborate policing job; they had found themselves well-placed observation posts with good fields of fire out of sheer habit. Then they had found their line broken by an impossible frontal assault and one CP destroyed in a matter of minutes. The loss of two or more posts had made it necessary to re-group, to *retreat from Commoners*. And when the headquarters post was lost—

Ordinarily it wouldn't matter. Next-in-command-takes-over, quite auto-

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matically, in less time than it takes to say—but to the stunned Armsmen it was a last straw in a nightmarish overload of their capacity to take it.

It was the very impossibility of the attack, the inability of trained men tradition-steeped, to believe it could happen that had won for them. When the Marsmen had scaled that cliff, the Brothers of the Order had lost their initiative of fire, and that was fatal.

They had all lost their initiative of fire now—Stars, Klin Teachers, the Order, the next Power Master. They would never win it back as long as battle-worn Marsmen could sit on a hilltop saying: "I have five brothers . . . my boys are big for their age—"

What had the Power Master said? "If they kept attacking the Watch Houses until all the gas guns were used up . . . we must have an Emperor for the Commoners to love—"

But there was no Power Master now, and the Emperor—The Emperor himself had made this battle possible. The Emperor and—

Until this moment he had not let himself think about her: not in the battle for fear of doing less than his utmost; not afterwards for fear of what he might find. But now it was all right, for she was safe."

The Lady Jocelyn came stumbling across the scarred rock, her face sober, her body drooping with fatigue, but her head held regally high.

"Thank you, Gunner Cade, for my wise uncle and for me."

She spoke formally, but he understood. There were no words with which he could have voiced his own joy. She was alive, unharmed. His arms could have told her, and his lips, but not with words.

"You owe no thanks to me," he said, "but to yourself and to our Brothers here."

Then their eyes met and even ceremonious language was impossible.

"Ho, Gunner!" It was Tucker, coming from below. "I'm getting them together down below. Should we leave a guard here?"

"What for?" With difficulty, Cade brought himself back to the moment and its realities. "Can your men carry more? Some of the CP equipment is worth salvaging."

Tucker turned over some of the headquarters rubble with his toe. "Any of this?"

"I'll look it over," he said, and turned to Jocelyn. "May I see you first? A few words—"

"Of course." She took his arm and he helped her down eroded steps to a sheltered place.

"What now?" he asked simply.

"Now? To the Star of Mars—to the Court. Then . . . well, perhaps we could go back. The Power Master had no heir designated; it might be safe to return to Earth. There will be endless confusion there and probably safety. But the Star of Mars would surely

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give you command of all fighting."

The words hung in the air.

"And you?" Cade asked.

"I don't know. There will be things to do. I'm not used to being idle."

"I wouldn't like to be his Gunner Superior," Cade said slowly. "I think I might like to marry some day."

"Oh, Cade!" There was laughter in her eyes. "This isn't Earth. It wouldn't be the Order again. Most of your Armsmen, if you call them that, would be married."

"I didn't think of that," he admitted. "The old habits—Jocelyn, Jocelyn, how can I ever say it? You're of the blood of the Emperor!"

"The Emperor," she said softly, "is just a man after all. He's a wise man—and married, too. He would understand."

Again he knew that words were not enough. As once before in anger, but now with tenderness, he seized her in his arms and pulled her to him. As once before in surprise, but now with knowledge, she kissed him back.

For minutes they sat together, until a shadow began to lengthen across them. Cade stood and pulled her to her feet.

"There's work to do," he said.

"Work for both of us, my darling."

"My darling," he said wonderingly, and then smiled. He had so much to learn.

THE END

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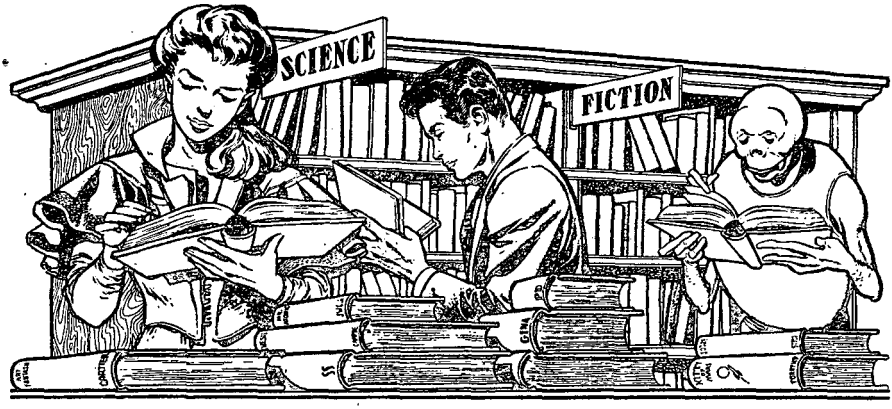

THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

THE "CLASSICS"

One of the most difficult decisions which publishers of science-fiction books must face is whether to devote the greater part of their list to the "classics," or whether to take a chance on new work, even by unestablished writers.

A "classic," in this sense, is a story which people have remembered. Originally there was only memory to keep them alive. The epic adventures of Gilgamesh and Odysseos, Beowulf and Hiawatha, were passed down from generation to generation long before there was any system of writing to freeze them into shape. So were the genealogies of "Genesis" and the Polynesians. Later, with writing, literary values began to come into the picture, and in our own time schoolteachers have succeeded in making numerous "classics" perpetually obnoxious by forcing youngsters to pore over them page by page and line by line. Still, artificial as this process of canonization may have been, it has kept "Ivanhoe" and "Silas Marner" and Emerson's essays in the public memory long after they might otherwise have slipped away, and has failed to kill "Treasure Island"—though "Alice in Wonderland" shows signs of mortal illness which Disney has done nothing to offset.

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The classics have the great advantage of free advertising. Everyone has heard of them. Everyone has wanted to read them—with a greater vehemence the more unobtainable they have appeared to be. By bringing them back, the publisher would seem to be answering the known demands of a goodly sector of his potential market. His gamble lies in whether the story in question is still memorable—whether it is anything a modern reader would linger over if it were published, new, in one of today's magazines.

Prime Press has brought out two bits of utopian Americana, "Equality; or A History of Lithconia" (Prime, 1947—original serial, 1802) and Mary Griffith's "Three Hundred Years Hence" (1836; Prime, 1950) which in our time are frankly only of antiquarian or scholarly interest to the average science-fiction reader. Some anthologists, notably August Derleth, have included period pieces in their collections to illustrate the development of this form of literature. But our concern here is with books—"great" works of science fiction—which their publishers contend are fit fare for present readers who may be looking for no more than entertainment and perhaps a titillated imagination.

Five books published in 1951 would probably be rated as classics by many readers: this ignores the many short stories resurrected by anthologists. Two of these slip under the wire only by arbitrarily setting 1940 as the original publication date which gives a story respectable antiquity; the other three go back to the decade between 1920 and 1930.

"Krakatit," by the Czech novelist Karel Capek, first appeared in English in 1925, two years after his play "R.U.R." firmly embedded the word and idea "robot" in our language. It now appears as "An Atomic Phantasy—Krakatit" (Arts, Inc., New York. 1951. 294 pp. $2.50). It has been called the first novel to utilize the atomic bomb theme, and perhaps it is, but it does so not for the bomb's own sake as a gadget, but to explore the effects of its secret on its unbalanced inventor, and on two ruthless groups of power-seekers in times not unlike our own. Prokop, who named his atomic explosive after the world's greatest natural explosion, the volcano Krakatoa, appears in the opening chapters sick, delirious, and fantasy-ridden. His formula is stolen by an adventurer, and when later he tries to track them down, he is embroiled first with a seemingly equally demented group of munitions barons who spirit him away, to a nearby country, and later with an equally fanatic set of revolutionaries. By this time it is difficult to say what in his experience is real and what is a product of his fever-tormented brain. Nothing could be farther from even the most stylized of our current science fiction

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in treatment, but Capek was not writing science fiction as such. Through a device since adopted by our field, he was exploring the shattering effects of supreme power on personalities and on societies. Prokop, the Edison-like wizard who seems able to produce an explosive by trial-and-error from any substance, fragmenting his own body and mind in the process, can perhaps be taken as the personification of Capek's thesis that mankind is the greatest explosive of all—and that it seems to be driving toward a final cataclysm with no more sense of direction, no more regard for its own security, than the unbalanced, tormented little inventor of Krakatit.

"The Blind Spot," by Austin Hall and Homer Eon Flint—reviewed here last September—brings us into the main stream of science-fantasy. The serial version, since it appeared in 1921, has been a legendary rarity; Prime puts it between covers for the first time. "Krakatit" could have been found in a large library; "The Blind Spot" lived only in memories, and in a few collections of Munsey magazines. It is less dated in style and content than might be expected; certainly the deft plotting of the early parts, while the mystery of the Blind Spot is building, stands with anything of Merritt's, though there is a letdown during the stages of unraveling once the world beyond the Spot is reached. As a fantastic story, expertly told, it is still excellent, but it must have gathered extra strength from the time of its appearance, at the close of the first World War, when there was the same flood of public interest in spiritism and the occult—Ouija, mediums, Madame Blavatsky, and Mu—which we have seen in our time. "The Blind Spot" is a good and colorful story of mystery and adventure now; in 1921 it may have been received by many readers as a kind of reassurance and revelation.

John Taine's "The Iron Star" (see last month) appeared first in 1930. Science fiction as a school of writing was only just in existence; certainly Taine had been writing long before it was recognized. Like Hall and Flint, he influenced what came later instead of being influenced by it. In "The Iron Star" his preoccupation with the borderline between physics and biology reached its peak, and he came as close as he ever did to making his readers care what happened to his oddly touching "hero," the Captain. "The Iron Star" is a classic because it represents the peak of its author's skill.

"Gray Lensman," by Dr. E. E. Smith (original version 1939) fits in the same category—an author who has identified himself with a particular type of story, performing at the top of his form. There is no great satiric plumbing of the foibles of humanity; there is no magic interweaving of color and mystery; there is really no strange scientific puzzle to be unraveled; but

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there is a fast-moving story to be told, bigger-than-life heroes to be followed, and an intergalactic scene to be grasped in what has come to be the archetype of space-opera. Jack-the-Giant-Killer was no great shakes as literature, either, but he has been remembered for a long, long time and he was probably in the Kinnison pedigree.

A. E. van Vogt's "Slan" is the youngest of the five; it was serialized in 1940 and is now in its second book incarnation—the first by Arkham House in 1945. It isn't the greatest superman story ever written—Olaf Stapledon's "Odd John," now available in a thirty-five cent paper bound edition, probably rates higher—but it is probably the most remembered, for around his theme of mutant humanity van Vogt wove a complicated pattern of mystery and action which will appeal to anyone. And with "Slan" the beginnings of a trend seem to appear in our line of "classic" science-fiction.

"Krakatit" is a novel in the full literary sense. It used a fantastic, scientific gadget only as a device to say certain things and suggest fundamental truths about people and their interrelationships. I am sure Karel Capek meant it to be taken seriously, as he did "R.U.R.," not merely as entertainment. "The Blind Spot," on the other hand, was entertainment to which science and fantasy had been added skillfully by way of color. The authors' skill and imagination has made the story live; they also provided one element which was prominent in most early science fiction. With "The Iron Star" we have an author of scientific background using fiction to propose or rather explore the possibilities of a borderline scientific suggestion—that radiation may influence, and even reverse evolution. In Dr. Smith's "Skylark" and "Lensman" yarns, science and color no longer obtrude—they slip into the background of a fast-moving adventure tale which has, however, cosmic scope and compass. Finally, with "Slan"—and with the best of the more recent stories—we have reached the stage where science fiction as entertainment is beginning to concern itself with people and their reactions under extrapolated circumstances, and is beginning to merge back with the stream of literature which produced "Krakatit" as a sport.

Not all present-day readers will consider all these five books good. One discerning reader whom I know cannot stand either "Slan" or "Iron Star"; most pure-bred fans will probably find "Krakatit" confusing and perhaps boring. But seen together and in sequence, the five books—all "classics" in the sense that they have stuck in people's memories for a good many years—give hope that the elements which make science fiction what it is—and which Fletcher Pratt has discussed in his introduction to "Worlds of Wonder"—will be transfused into

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the main stream of literature, will strengthen it, give it new life, and encourage major publishers to resume the experimentation which they have dropped since Capek's day. Will we see books in our time which will be considered "off trail"—"novas"—"thought variants" by the rank and file of science-fiction readers?

THE GREEN HILLS OF EARTH, by Robert A. Heinlein. Shasta Publishers, Chicago. 1951. 256 pp. $3.00

This second volume in Robert Heinlein's "Future History" series of inconsistent stories does not have the new bonus story which made "The Man Who Sold the Moon" a must for any science-fiction reader, and lacking such new material Blind Rhysling is not made the unifying personality that Harriman was in the earlier book. Indeed, as Mark Reinsberg points out in a brief introduction, the Moon and not Rhysling is really the center of interest.

The structure into which Heinlein's stories fit, shown in the end-paper charts, reveals that this book overlaps the first in that its first two stories, "Delilah and the Space-Rigger" and "Space Jockey," fit into the interval between Harriman's successful Moon rocket and his death in "Requiem," the story which closed "The Man Who Sold the Moon." These are simple stories of human reactions—a woman among the riggers who are building Earth's first satellite station; a pilot torn between his love of his job and his wife's fears each time he goes into space. So, for the most part, are the other tales in the book: "The Black Pits of Luna" with its cussed youngster lost on the Moon; "Gentlemen Be Seated" with its ingenious solution to a leak in space; "Ordeal in Space," with its hero trying to regain the courage he has lost in the void; and especially "It's Great to be Back!"—one of Heinlein's best and most humanly real stories which follows a couple home to Earth from the Moon. This and three others, including the title story about Rhysling's troubled career, are from *The Saturday Evening Post*, and others are from such unlikely sources as *Town and Country* and *The American Legion Magazine*. Only two of the ten stories in the book appeared first here. These are "—We Also Walk Dogs," and the closing novelette, "Logic of Empire," which shows how profitable—and in the long run profitless—man's systematic inhumanity to man can be. "The Long Watch," earlier in the book, is a story of how one man reacted to an attempted coup by the military at Moon Base.

In the later stories there is occasional mention of Nehemiah Scudder, the evangelist who may provide a personality around which the next in the series is built.—especially if Robert Heinlein can be persuaded to fill in more of the "stories-to-be-told" which are scattered tantalizingly through that chart of his.

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TOMORROW AND TOMORROW and THE FAIRY CHESSMEN, by Lewis Padgett. Gnome Press, New York. 1951. 254 pp. $2.75

Last month, reviewing Fletcher Pratt's "Double in Space," I gave Doubleday implied credit for publishing a two-in-one combination of short novels instead of insisting on a forced expansion to "book" length. Actually, of course, Gnome had already tried the same trick successfully this year with the two Hubbard yarns—"Typewriter in the Sky" and "Fear"—and Fantasy Press has done it with de Camp's "Divide and Rule" and "Stolen Dormouse," with Williamson's "Cometeers" and "One Against the Legion," and in a sense with John Campbell's trio of tales in "The Incredible Planet." It's still a good idea, and Gnome has done it again with this memorable pair from the facile—not to say agile—typewriter of Henry Kuttner, alias "Lewis Padgett."

"The Fairy Chessmen," which appeared here in two parts in 1946, opens with that unforgettable sentence: "The doorknob opened a blue eye and looked at him." Who could stop after that? You won't, of course, although a rank neophyte may find the concepts of variable truth a bit staggering. The situation, if you remember, is a world struggle of the distant future, into which is injected a highly disturbing element in the form of a mysterious "equation" whose solution throws scientist after scientist into madness via such improbabilities as floating in thin air, shrinking to a point, and imagining the world out of existence. Robert Cameron, director of psychometrics—the person whose doorknob ogled him—is aided in his search for a way out by two assistants and a mutant boy with the extraordinary power of ETP—extratemporal perception, in which past, present, and future merge into one world-line. But not until Cameron turns to the players of fairy chess is the equation resolved, the enemy defeated, and an *agent provacateur* out of time put in his place.

Billy Van Ness, the perceptive mutant of "Chessmen," has a parallel in The Freak, who is at the core of the involved maneuverings of "Tomorrow and Tomorrow" (ASF, 1947). Here we have a world not too far in our own future, in which a Global Peace Commission has stopped research in its tracks and dedicated itself to maintaining the *status quo*. Joseph Breden, watcher at Uranium Pile I, doesn't see blue eyes in the doorknobs, but he does have recurrent dreams of killing his fellow-watcher and letting the pile reach critical mass—with the assumption that it will take the planet with it when it goes off. His dreams come from an underground of restless folk who are sure another world atomic war is needed to get rid of the GPC and shake mankind into further prog-

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ress—for the mutant Freak, who they believe can see the future, seems to give assurance that a reawakening will really result. Then it develops that he is seeing parallel probability worlds instead of the future—and the fun has started.

These two stories are in the van Vogtian tradition of ultra-involved mystification, of which more elsewhere. The Padgett-Kuttner touch assures that they will be among the best of the kind. They are.

THE OUTER REACHES, edited by August Derleth. Pellegrini & Cudahy, New York. 1951. 342 pp. $3.95

The inexhaustible August Derleth, departing for the time being from his series of source-books in the history of science fiction—"Beyond Time and Space," "Far Boundaries"—has assembled an anthology which should have greater appeal to the average reader than these more scholarly books.

In "The Outer Reaches" seventeen leading authors have chosen their favorite short stories, and explained the reasons for their choice. In some cases these are the stories they consider their "best" work; in others they are stories, neglected by other anthologists, which the author would like to see given a bit more recognition. The idea is not new—Leo Margulies and Oscar J. Friend tried it two years ago in "My Best Science Fiction Story," published by Merlin Press and with much the same stable of authors—but the selections are good and in some cases—Fritz Leiber's "The Ship Sails at Midnight," Ray Bradbury's "Ylla," Clifford Simak's "Good Night, Mr. James," and A. E. van Vogt's "Co-Operate—or Else!" for example—they are outstanding.

Although the selections cover more than twenty years, back to Dr. David H. Keller's "Service First" of 1930, with Clark Ashton Smith's "The Plutonian Drug" from 1934 and Donald Wandrei's "Finality Unlimited" from 1936, seven of the stories have been published during the last two years. For your information, here is the roundup: the van Vogt yarn from 1942; Isaac Asimov's "Death Sentence" and Henry Kuttner's "Shock," 1943; Murray Leinster's exasperating "The Power" and Frank Belknap Long's "The Critters", 1945; Fletcher Pratt's "Pardon My Mistake," 1946; Theodore Sturgeon's "Farewell to Eden," 1949; four from 1950—the Bradbury gem, Cleve Cartmill's "The Green Cat," and L. Sprague de Camp's "Git Along!", with Leiber's strikingly human tale; and as of 1951, Poul Anderson's "Interloper," Nelson Bond's "This Is the Land," and the Simak story. They aren't all deathless prose, but they are all examples of the editor's good taste in writers and the authors' good taste in the difficult job of screening their own writings.

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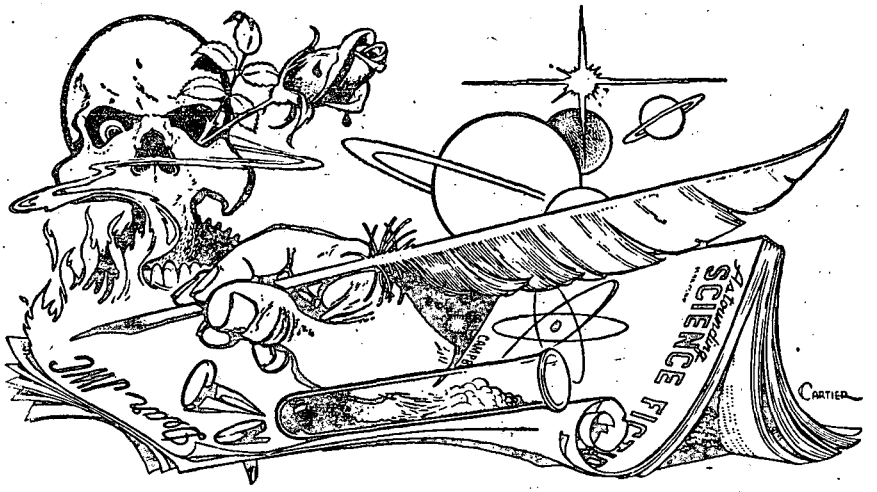

BRASS TACKS

Dear Sir:

I should like to suggest that you publish brief reviews of all science-fiction motion pitcures. Had you reviewed one I have just seen, I'd have been spared sitting through a picture in which the control cabin rotates within a spaceship in flight and is held "vertical" by gyroscopes; two mathematicians are carried to plot the course but power must be used to escape the gravity of the moon; swarms of glowing red meteors are met beyond the orbit of the moon; and sentient beings on Mars are identical with the Earthmen in shape and customs, except that the women wear dresses barely covering their hips—very nice hip movements these Martian girls have . . . best part of the picture. Mars has an ore called corium that not only supplies hydrogen and oxygen, but also serves as a substitute for uranium to replace the atomic pile, wrecked in the crash landing on Mars. The blurbs on the posters were correct, this is truly a fantastic story.—Edward Dillingham, Stevens Institute of Technology, Hoboken, New Jersey.

We will start reviews. Until recently, the crop was too small to discuss!

Dear Editor:

The time has come for all science-

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fiction readers and enthusiasts to realize that an event of national importance is taking place in San Diego.

Namely, on June 28th and 29th. The Sou-Westercon.

This will be a convention in the world-famous U. S. Grant Hotel—any taxicab driver or cop can tell you where—and the attendance fee will be less than you would normally expect.

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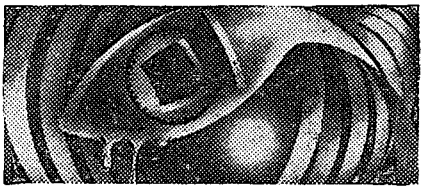

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Dear Mr. Campbell:

Your magazine seems to be developing into quite a forum for intellectual play and extrapolation, and the correspondence and your own editorials are by no means the least interesting features in this respect. In particular, the editorial discussing a semantic based on subjective responses was most provocative and opened a novel field of speculation—not an easy feat when so many fields have been opened already.

Speculating on this topic, I hit on the notion that perhaps such a semantic already exists. We certainly have a symbolism that meets the requirements, though it seems to occur only among people of high sophistication rather than in primitive societies. This symbolism we call music.

Look it over and see if it doesn't fit. To be sure, it does not constitute a system of one-to-one symbols such as are best suited to objective events and objects; but that might have been expected. A musical statement is, so to speak, an algebraic expression which can be made to fit any number of objective circumstances, while always retaining the essential subjective factor common to them all. Thus the jubilation I experience from a Mozart concerto may be associated in my mind with a spring morning, a dance, a ripple of colors on water, a little drama, or simply an undefined inner merriment; the subjective feeling is always the same.

Incidentally, this makes music the nearest approach to single-valued logic yet devised by man. The idea could be developed into volumes.

While I am at it; let me give my wholehearted support to your use of serials. They give you a wider field to choose from and so should enable you to keep your average higher than ever. The Hal Clement story is a masterpiece—a thoroughly good yarn well and warmly written, with genuine ideas deftly touched in, and a clever development of genuine scientific theory, to say nothing of his feat in developing extraterrestrial personalities. —H. Chandler Elliott, The University of Nebraska, College of Medicine, 42nd and Dewey Avenue, Omaha 5, Nebraska.

I agree with that concept—and with the suggestion that, necessarily, an emotional symbolism will not have a one-to-one correspondence with objective units, nor with objective experiences; if it did, it would not be an emotional semantic!

Dear Sirs:

Your essay in the December issue concerning "Primitive Language" is interesting not alone as abstract philosophy but because you have described quite accurately a modern, human, un-primitive language—Japanese. Your choice of "water" as an example of the sort of concept you

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". . . I am immensely enjoying this opportunity to discuss and learn."

—a member of the Faculty, Dept. of Physiological Sciences, Dartmouth Medical School.

We began these courses in Feb. 1951, and we now have enrolments in 33 states of the United States, and in Alaska, Argentina, Canada, Cuba, England, Italy, South Africa, and Venezuela. Here is our latest list of courses (but we are adding new courses all the time):

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had in mind could not have been more apt for the Japanese have just the sort of distinction you mention.

In the words for water, cold water is one word, *mizu*, hot water is a quite different one, *oyō*, and water in the abstract is usually *sui*, unless euphony dictates otherwise. In Japanese one is continually colliding with vast arrays of individual names for various aspects of things which we would give one name or at least have a collective term, whereas other concepts involving what we consider entirely different objects of similar function, let us say, are grouped under one heading and may not even have any words or suffixes for the sub-groups.

This makes Japanese a very difficult language to be exact in, though an easy one to be polite or poetic. So the Japanese annex German and English words to do their scientific thinking but refuse politely and smilingly to give in on the matter that iris growing in the water—which have stiff, swordlike leaves—are a quite different concept from iris growing in the field—with floppy leaves—and therefore can not possibly have a single "generic" name. Obviously, one symbolizes manly valor, the other womanly grace and beauty; how can one lump them?

Perhaps it is because of this that the Japanese are more indifferent

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than we to mechanical things, for themselves. While they admire mechanical civilization, are quick at learning it, adapting it and—yes—inventing it, they keep reserved inside, in a sort of separate language, the belief that the eternal verities are family affection, simple living, humble perspective in one's relationship to others—and to Heaven—and consequent peace of soul, regardless of whether one has an automobile, a radio, a television set, an electric stove or an electric refrigerator, or nothing.

Shall we say that language creates states of mind—or do we invent language, like Gods, which reflect the state of mind we have?—Austin W. Morrill, Jr., Belvoir, Virginia.

I didn't know of that characteristic of Japanese—but I did know that all Japanese scientific work was done in European languages.

Dear John:

The January '51 ASF is a fine issue; I thought every story but one outstanding of its kind. I'd rank them this way:

1. TELEK, Jack Vance
2. THE ANALOGUES, Damon Knight
3. THAT SHARE OF GLORY, C. M. Kornbluth
4. INSTINCT, Lester del Rey
6. SITTING DUCK, Oliver Saari

And choosing between the Knight and the Kornbluth pieces was a tough job.

Didn't much care for the thinking-machine article, which I felt consisted largely of counter-juggling, but the hydroponics piece amused me all the way through. Naturally, I was particularly taken with this sentence:

"So with Joe Moonraker, try giving him a gooey algae sandwich that 'tastes just like steak' and what happened to Captain Bligh will give you some idea of affairs in the Rift after about a week of that."

As it happens, I quite agree with Mr. Klotzbach that familiarity and flavor will receive the primary stress in feeding spacemen, even long-aloft specimens like the Okies; I wouldn't think of demanding that Amalfi, Hazleton and the rest subsist on gooey algae sandwiches. The advantage of *Chlorella* or a similar alga as the main crop for a very large interstellar craft, such as an Okie city, lies not only in the large yields which are possible, but also in their flexibility. *Chlorella*, for instance, can be made to yield a higher percentage of fats and oils or of protein, depending upon how it's handled; these materials then become the raw stuffs for synthesization of more familiar-looking and familiar-tasting foods. Furthermore, algae are tough and not subject to the whims of tomato plants and other more highly developed vegetable organisms—and the yields really are high. The figure I quoted in "Bindlestiff" is an average sample.

But eat the algae direct? Gods of all

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stars, as Hazleton would say. I'd as soon try to eat a live cow. I prefer my foods processed, and I'll bet Mr. Klotzbach does too.—James Blish.

It'd be worse eating the cow, come to think of it. Chlorella can't kick.

Dear John:

The subject of this letter to Brass Tacks is H. Beam Piper's story "Day of the Moron." I comment here upon the story and recent discussion in Astounding, especially Mr. Slone's lengthy letter in January Brass Tacks.

"Day of the Moron" was in my opinion one of the best stories which you have printed, and the fact that it has proven to be controversial in nature adds to its high caliber and excellence.

I wish to point out here one main issue which I feel cannot be overlooked —the factor of Responsibility. Scott Melroy as executive of Melroy Engineering Corporation had assumed a responsibility of a high order, far above the level of the individual. Millions of people, and the well being of a large portion of the nation's industrial structure hinged upon the continued operation of the Nuclear Reaction Plant.

It has been said that "One can delegate Authority, but never Responsibility." In order to fulfill the requirements of responsibility when the action required cannot be carried

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through by the responsible person alone, said person must intrust Authority with care and judgment, to the hands of others. The executive must use foresight to estimate the ability of those he intrusts with authority to perform the task required, and in their turn to be responsible to him, in the proper conduct of their duties.

In a situation of the type here concerned or in comparable situations of real life of the present, the responsible executive must be entitled to the right of "Free Decision" to state "I will" or "I will not employ John Doe to perform a given task, because it is my opinion that he is not suited to do so, thus my own responsibility would be in jeopardy." Personalities are not concerned here. Labor relations in this specific are secondary, because of the high order of importance of the task to be performed.

In a task the results of which can be rectified in the event of error the responsibility is of a lesser order, and correction can serve as second best to prevention, but in Nuclear reactor operation, maintenance and alteration, the high order of catastrophe which can result from simple error should be obvious, thus prevention should be the only satisfactory level of action, correction standing as not merely impracticable but approaching the impossible.

If even reasonable doubt was evident as to competence in such a situation, the right to prevent with foresight should not have been denied to Mr. Melroy.

Without doubt the rights of the individual employee should be protected, and this is the function for which labor organizations were designed but this individual well being should not be placed before the well being of millions of people and the nation's industrial structure.

Assuming that the psychological testing procedures employed by Melroy Engineering were practical, and reasonable valid procedures, the skilled psychologist should also consider the reaction of the individual being tested to the test in itself as a unit, not merely to the questions of the test. The maladjusted personality will commonly make unreasonable assumptions such as persecution or discrimination toward the individual as motive for the testing procedures. Such was the case in this narrative.

It may be open to question in any such situation as to just who is the "Moron," however in this specific situation the realm of higher order responsibility was clearly defined, and the result of denial of the right to prevent catastrophe by management foresight in a case where foresight was without admissible alternative is clearly indicated by the ultimate destruction of the plant, and resultant death, injury, and hardship.

Let us consider another side of the picture: What might or might not

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have taken place had Melroy employed the men forced upon him by Union rules and regulations without testing, and without the resultant turmoil from testing—taking at face value supposed ability to perform the required tasks properly. (1) The process of installing the cybernetic control system for the breeder-reactors might have been successful, the operation of the control system might have been satisfactory, and accidental catastrophe due to the eight probable ways to reach critical mass in the reactors might have been avoided. These factors constitute a wide range of optimistic assumption to be made without concomitant basis in fact. BUT all of these MIGHT have taken place, therefore Melroy might have been the MORON for having harbored unreasonable fears. (2) Nonetheless, the possibility still remains that any of the above errors could have resulted in failure and/or destruction of the plant.

Melroy chose foresight, but had he been able to predict the partial result of his foresight, the turmoil in labor circles and resultant certainly irrational action of refiring the reactor without proper checking for critical mass material, he might have chosen a different course. What that alternative course, to include foresight in a concealed manner, perhaps, might have been is difficult to deduce.

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As the situation in the narrative exists, however, the most important factor to be considered is that the responsible executive was denied right of action, by a narrow minded, not too sensible attitude that "Management was wrong, and Labor was right" on the part of Union officials. Such a preformed opinion alone is sufficient to hazard our well being because it precludes judgment designed to fit the situation as such occurs. Without reviewing the relative "facts" concerned in the individual case, the decision was already determined—The attitude of Government officials connected with the operation that proper handling of Labor was of primary importance in order to keep the men on the job operating the entire plant, such being more important than the possible danger of error resulting in destruction, was also I fear not too sensible an approach. Why worry about men to operate the plant if there might not be a plant to operate.

To sum up, I find the story excellently presented, well researched and intensely interesting. The mere fact that such a situation is possible at present, and that such situations may have occurred or are in the process of occurrence at this writing, is indicative of a necessity to look for flaws not merely in individuals but in our system as a whole.—James F. Pinkham, 132 Wesley Avenue, Ocean City, New Jersey.

I still feel Slone's point well taken: that Melroy should have recognized labor-management stresses were capable of critical-mass explosions too. And explosive human action is the most dangerous force in the known Universe!

Dear Sir:

I should like to comment on one desirable feature in the article "Symbolic Logic and Metamathematics." This is the bibliography at the end of the article. Articles in ASTOUNDING are an accepted and, to me at least, a desirable feature for they bring to the attention of those of us specializing in one field of science, interesting developments in other fields of which we may not otherwise be aware. When an article is presented which arouses interest, I should imagine that there are many readers who would like to follow up the short presentation with further collateral reading. For this reason, I should think that a short bibliography to general or introductory works should be made a required feature of all future articles. Dr. Andrew Streitwieser, Jr., Room 2-314, Massachusetts Institute of Technology, Cambridge 39, Massachusetts.

The criticism is sound; we'll try to comply where applicable.

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